American Forestry

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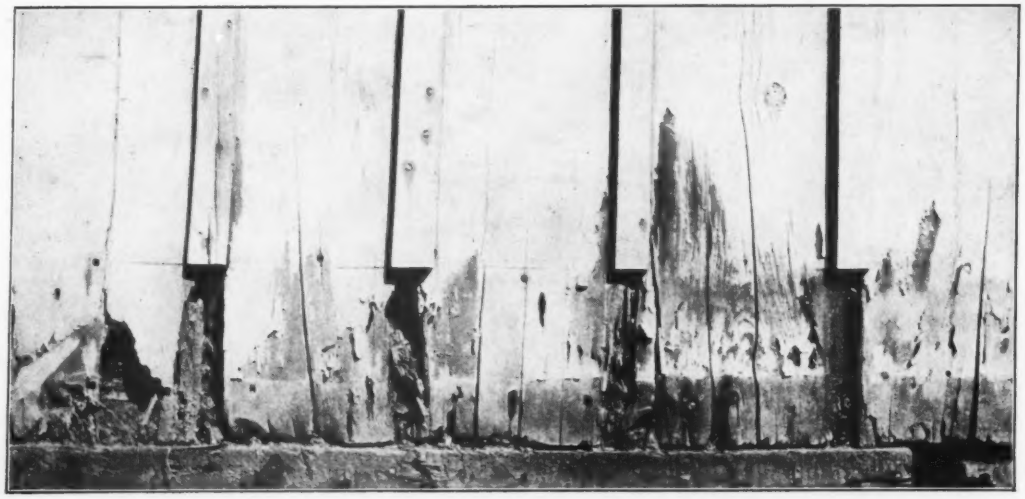
THE BALD CYPRESS



Decayed Barn Sill. Note condition of siding at point of contact with sill. (Courtesy U. S. Forest Service.)

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Conditions, such as illustrated above, cause the consumer to resort to substitutes. Not only is the wooden sill destroyed by decay, representing a monetary loss in material and labor, but a germinating place for dangerous bacteria and insects is provided by the decayed wood.

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AMERICAN FORESTRY

The Magazine of the American Forestry Association

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OCTOBER 1916. VOL. 22 — CONTENTS — No. 274

The Bald Cypress—Cover Picture.

The Bald Cypress—Identification and Characteristics—By Samuel B. Detwiler 577
With six illustrations.

Commercial Uses of Cypress 581
With eleven illustrations.

Boy Scouts in City Park Work—By H. H. Tryon 585
With one illustration.

Crater Lake National Park—By Mark Daniels 586
With eight illustrations.

Fighting A Forest Fire—By James Brown 593
With one illustration.

War Consuming Britain's Forests 594
With eight illustrations.

Deserts Due to Deforestation—By Moye Wicks 598
With nine illustrations.

The Bird Department—By A. A. Allen 607
Federal Protection of Birds.
The Crows and Jays.
With seven illustrations.

The White-Throated Sparrow—By Paulina Brandreth, Poem .. 611

An Appalachian Purchase 611

Forestry for Boys and Girls—By Bristow Adams 612
Is Jack Frost the Real Artist?

War-Time Uses of Forest Products—By A. W. Schorger 614

Under Fire in War Zone Forests—Lieutenant H. K. Robinson . 616

How to Measure Height of Trees 618
With one illustration.

Western Public Lands and National Forests—By H. H. Chapman. 619

Ornamental and Shade Trees—By J. J. Levison 622
The Tree Census.

North Carolina's Forest Fires 625

New Ways of Making Paper 625

Wood Preserving Department—By E. A. Sterling 626

Editorial 627
Canadian Forest Protection.
The White Pine Blister Rust.
The Farm Woodlot.

Book Reviews 629

Canadian Department—By Ellwood Wilson 629

Current Literature 630

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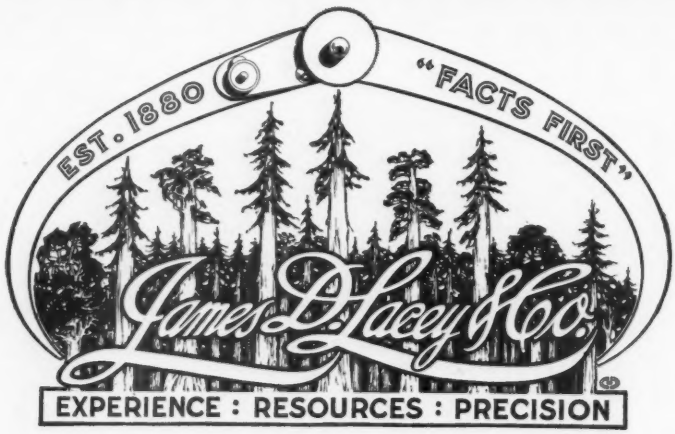

He Was "Stuck" On His Tract

Once there was a man who had what was reputed to be an exceptionally valuable tract of timberland—no matter where—which he bought on an old-fashioned "timber cruise" plus his personal inspection.

Wishing to take his profit on the investment he confidently offered the tract to James D. Lacey & Company.

Besides the reputation of the tract there were superficial indications of unusual excellence; but Lacey & Company deal only with THE FACTS.

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AMERICAN FORESTRY

VOL. XXII OCTOBER 1916 No. 274

The Bald Cypress

(Taxodium distichum)

Identification and Characteristics

BY SAMUEL B. DETWILER

THE interesting habits of the bald cypress give it special distinction in the forest community. It is one of the few cone-bearing trees that shed their leaves each year, and the branches that bear the leaves also fall with them. It has ability to send up vigorous sprouts from the stumps when the trees are cut,—a rare power in conifers. Not only is it exceptionally beautiful in form and foliage, but it is one of our most valuable lumber-producing trees, with heartwood so durable that it has the title of "The Wood Eternal." Other trees are adapted for growth in swamps, but they soon die if the soil is continuously flooded. Bald cypress alone can live and thrive with its roots always submerged; the unique "knees" which enable this tree to sustain life under such extremely adverse conditions have furnished scientists with a fascinating problem as to how they accomplish their purpose.

Bald cypress (*Taxodium distichum*) traces its descent from a very ancient family. Prior to the glacial epoch, it grew in the Arctic regions of North America and Europe. Bald cypress should not be confused with the true cypresses, to which the European cypress belongs. It has two closely related species, one a shrub native to China, the other a large tree found in Mexico. The Mexican cypress may reach 40 feet in diameter at the base and lives to a great age. The "Cypress of Montezuma," reverenced by the Indians long before the discovery of America, belongs to the Mexican species. The natural growth of bald cypress is found in the wide strip of low, sandy land bordering the Atlantic and Gulf coasts, from southern Delaware (and the extreme southern portion of New Jersey) to southern Texas. It grows in all sections of Florida, Louisiana and Mississippi and extends northward through the Mississippi Valley to southern Indiana and western Kentucky.

THE BALD CYPRESS

Cypress is a conifer, but not an evergreen tree, and both leaves and branchlets are dropped in the fall. The foliage consists of very small, flat, or needle-shaped leaves, arranged either in two horizontal rows or clinging closely to fragile branchlets. The pollen-bearing flowers appear in the spring in purple drooping clusters borne at the ends of the twigs. Each flower consists of a few small pollen-bearing scales. The globular cones are brown in color and are about the size of a small walnut. They are scattered singly or in pairs near the tips of the branches and ripen their seed in the fall from flowers that appear early in the spring. Bald cypress is interesting, botanically, as one of the few surviving members of a race of trees which was prominent in geologic times. Among its associates were the redwoods of California. Only two other close relatives are known, one an evergreen cypress on the tablelands of Mexico and the other a tree occurring in China.

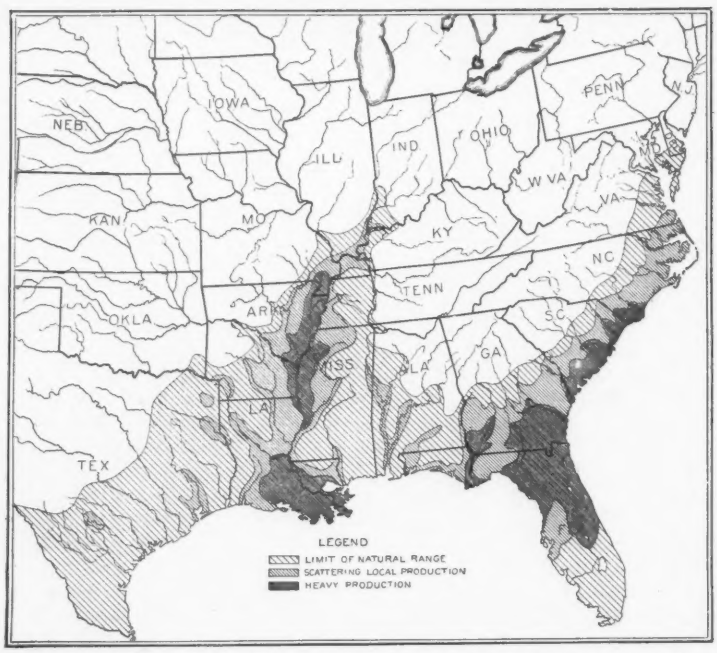
In very wet places the foot of the trunk flares into a fluted, heavily ridged cone, which may be so broad at the base that the tree appears as though it had built a platform on which to erect its trunk. The enlargement of the base, combined with the peculiarities of its root system, gives the tree great stability in the ooze of the sloughs and swamps. Windstorms that uproot the oaks do not harm the cypress. Above the swollen base the trunk tapers evenly and is usually straight. When young, the trees have rather erect branches, forming a handsome and symmetrical pyramid, but later the branches droop slightly. Old trees lose their lower branches and the tops become rounded in the open or broad and flattened in the forest; such trees, especially when festooned

with Spanish moss, are highly picturesque. Trunks of mature trees are well rounded, and usually hollow at the base. The ordinary diameters are 3 to 5 feet, but veterans 12 feet through are found. The tallest individuals rise to a height of 140 to 150 feet, the average height being 100 to 120 feet.

Cypress "knees" arouse the curiosity of the visitor when he first sees them. A single tree may be surrounded by fifty or one hundred of these peculiar growths, formed only when the trees stand in wet places. If the water is high, the "knees" appear as steeple-like projections above the surface, some having a regular cone shape, others fantastically knobbed and gnarled. Low water reveals that they spring from the roots of the tree, forming an astonishing system of humps and hollows. Further investigation will show that each knee has its own system of intricately branched roots, reaching down into the muck. In places subject to very high water for part of the year, the knees may be 8 or 10 feet high, but usually they are only from 1 to 4 feet high. Apparently their purpose is to reach above the water to supply air to the roots, and also to furnish a firm footing for the great weight of the tree in quagmires where engineers would have difficulty in devising a foundation capable of supporting a similar weight. The softer the soil, the larger and more numerous are the knees. They are hollow except very early in their development, and the wood of which they are formed is exceedingly twisted in grain and very light in weight. The knees never send up sprouts and they die after the tree is felled.

The bark of the trunks may be thin and scaly or thick and deeply furrowed. Apparently, this variation is due to differences in the conditions of soil and moisture under which the trees grow. The color of the surface of the bark varies from light brown to a deep reddish hue. When the bark is broken it pulls apart into long fibrous strips of an attractive cinnamon shade of reddish brown.

The graceful light green foliage of bald cypress is especially attractive. The leaves are of two kinds, and



GEOGRAPHICAL AND COMMERCIAL DISTRIBUTION OF CYPRESS IN THE UNITED STATES

Although seven species commonly known as cypresses grow in the United States, only one, bald cypress (*Taxodium distichum*), is of great commercial importance. *Taxodium imbricarium*, a closely related species, occurs in the same range as bald cypress and is cut and used with it. Cypress is restricted in its natural occurrence to deep, rich swamp-lands, but when planted it thrives in as wide a range of climate and soil as most of our forest trees. Naturally, however, it occurs in commercially important quantities only in regions where logging is difficult and expensive. The introduction of larger and more efficient logging machinery has advanced the logging in any specified region from the water fronts into the deeper and less accessible swamp areas. Thus, the evolution in logging methods chiefly accounts for the continual commercial importance of cypress in regions where lumbering was actively in progress many years ago.

are borne on tiny branches that are shed with the leaves. In the first type the leaves are thin and soft-textured, a half to three-quarters of an inch long, narrow, flattened and pointed. They stand in two horizontal rows on the tiny branches, like the teeth of a comb, and the branch with its leaves may be easily mistaken for a single compound leaf. The second type of leaf is tiny and scale-like, and clinging closely to the branch and partly overlapping it, so that the branch resembles a delicately wrought chain of leaves. Trees with foliage of this kind are said by some botanists to be a distinct variety (*imbricarium*) of bald cypress.

The flowers are of two kinds. The pollen is shed in spring from drooping clusters of minute purple flowers. The stems of the flower-clusters are 4 to 6 inches long and are borne at the ends of the twigs. The seed-forming flowers are scattered near the ends of the branches. They are composed of numerous overlapping, pointed scales and somewhat resemble buds. When ripened in the autumn, they are transformed into brown woody cones of the size and shape of a small walnut.

The seeds are winged at one end, one-fourth to three-fourths of an inch long, and each cone produces from 20 to 30 seeds. Because the cone contains pockets of very sticky resin with a disagreeable flavor, the seeds are little relished by squirrels, mice or birds. The cones open and permit the seeds to escape but they are too heavy to be carried far by the wind and fall near the parent trees. A pound of clean bald cypress seed contains about 5000 separate seeds—a small number compared with the 80,000 seeds in a pound of Norway spruce. Under ordinary conditions only about half of the seeds have sufficient vitality to germinate. The older trees produce some cones each year and abundant crops are borne every 3 to 5 years. The seeds do not mature well in the northern range of the tree. Since the cypress tree is an inhabitant of swamp-lands the seeds germinate best in very moist places, such as wet muck or beds of sphagnum moss.

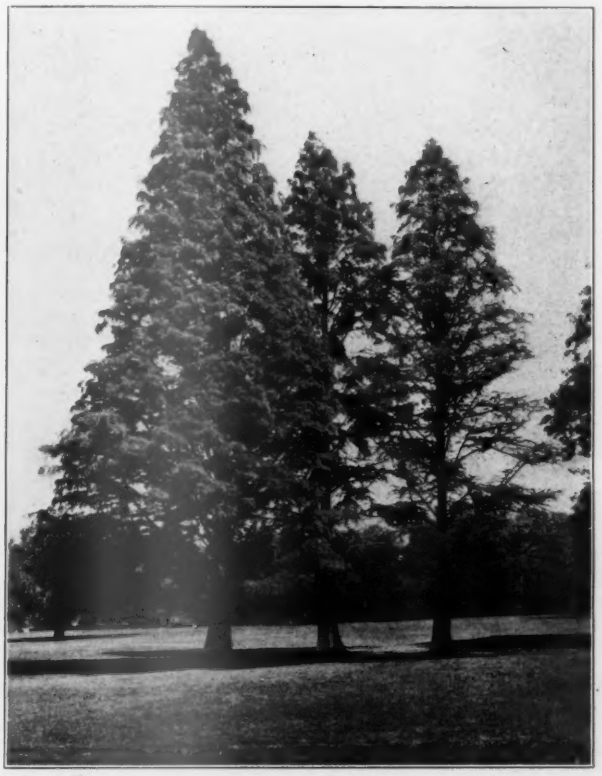
The absolute inability of most cone-bearing trees to produce even the weakest of sprouts from the stumps

after the trees are felled is well known. It is decidedly interesting to know that cypress can produce thrifty sprouts, not only from the stumps of young trees, but also from the stumps of trees up to 180 to 200 years of age. This peculiarity of cypress is of considerable commercial value, since vigorous trees 10 to 14 inches in diameter, cut during the period when active growth has ceased, nearly always are able to send up strong sprouts that make much more rapid growth than seedlings. In many localities it is the practice of the loggers to girdle the cypress trees a year prior to felling them so that the logs will float. In such cases the stumps do not produce sprouts.

AN OLD CYPRESS

The prevailing size of mature trees in ordinary situations is somewhere about 3 to 5 feet in diameter at breast height (4½ feet above the ground) by from 100 to 120 feet in height. In the highly acid soils of ponds and poorly drained, flat swamps, the average maximum size is about 2 feet in diameter by from 50 to 70 feet in height. The largest trees scattered on ordinary sites are 7 to 8 feet in diameter. The maximum diameter for cypress is about 12 feet measured at breast height. Maximum heights of from 140 to 150 feet are occasionally reached. The trunks of the trees of largest diameters are usually hollow at the base and more or less broken at the top. Cypress attains so great an age that the life periods of virgin stands are better spoken of in terms of centuries than decades. Trees from 400 to 600 years old are very common, and those from 600 to 900 years are scattered through the South. The age attained seems to be limited chiefly by the ability of the tree to resist the attacks of fungi and force of the wind. Old trees die backward or downward during a period usually of one to three or four centuries. The last stage is usually a hollow cylinder consisting of sapwood from which the heart has been removed by decay. It is not improbable that the ages of these hollow veteran cypresses range from 1000 to 2000 years.

The home of the cypress tree is naturally in swamps, ponds and other poorly drained soils. Practically all of the native cypress forests are found at elevations of less than 100 feet above sea level. The upper limit of its growth in the Mississippi Valley is at an elevation of about 500 feet, but on the Edwards Plateau of Texas it is found bordering the deep hollows at elevations of 1000 to 1750 feet. Apparently the chief demand for the successful growth of the cypress is an abundance of soil moisture. It cannot grow in poor, very dry, sandy soils, but in muck, clay or the finer sands, where moisture is abundant and fairly permanent, cypress makes good growth. In ponds where water remains stagnant throughout the entire year the cypress grows very slowly and does not reach large size. Such trees are known as "pond" cypress. Although we think of cypress as a tree of the South, its natural growth extends into a region where the winters are fairly severe and individual trees planted as far north as Massachusetts and Michigan show that it will live where the temperature falls to 20 degrees below zero (F.).

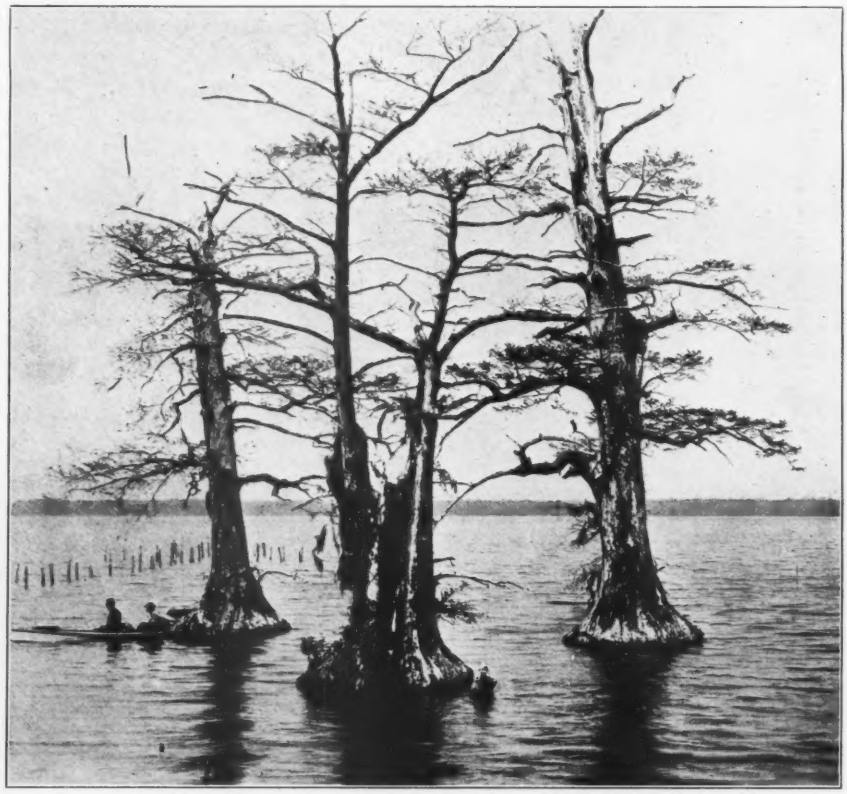


PARK GROWN CYPRESS

Cypress is readily grown from seed and is well adapted to nursery practice. By many authorities it is considered one of the most beautiful and ornamental trees for park planting, for which it has been used quite widely over the eastern and central portions of the United States. Although cypress has not been raised in forest plantations on a large commercial scale, experience thus far points to the commercial success of forest planting, under certain conditions, in the deeper and fresher soils. The rate of growth of individual cypress trees is closely comparable to that of the more rapid hardwoods. Under cultivation, trees grow from 18 to 24 feet in height in the first 10 years. The best height growth in Ohio, for example, has been 3 feet annually for a few years. In fresh or moist soil west of Columbus, some cypress trees are growing 30 inches a year in height. In dry situations, such as eroded clay hillsides and in loose gravelly soils, growth is less than a foot a year. In the District of Columbia cypresses 50 years old are from 20 to 30 inches in diameter by 65 to 84 feet in height, excelling all associated species in rate of height growth. Measurements on growth in forest plantations are not available, but observations show a good development of cypress in height and diameter when properly spaced in planted stands.

Bald cypress lives to a great age. In the virgin forest, trees 400 to 600 years old are numerous, and old graybeards from 750 to 1200 years of age are not difficult to find. These old native trees grow very slowly, but

when cypress is given favorable conditions for development, such as on cut-over lands or in the open, both diameter and height growth are found to be moderately rapid and well maintained. The average diameter increase in such cases varies from 1½ to 3 inches in 10 years. The average height growth up to about 100 years of age is about 1 foot per year, the rate being considerably more rapid during the first fifty years than after. Few coniferous seedlings grow so vigorously from seed during the years of infancy. Cypress seedlings reach a height of from 8 to 14 inches the first year and 16 to 24 inches the second year. Cypress also possesses the ability to heal wounds in the bark at a rapid rate. So strong is this power that stumps 2 feet in diameter are occasionally found that have healed over and are still alive several years after the tree has been cut, although without producing sprouts.



CYPRESS ON LAKE DRUMMOND IN THE DISMAL SWAMP

Cypress inhabits permanent swamps much too wet for agriculture and most other uses, except when drained. The present logging of cypress is attended by difficulties of a kind unknown in handling any other commercial timber. The bulk of all cypress is now logged by massive steam machinery moved from place to place on railroads built into the deepest parts of swamps over soft and treacherous ground. Another method is called pull-boat logging. The pull-boat has a stationary engine mounted on a float or barge and it skids the cypress over the soft surface for distances up to 2000 feet or more. The dredge-boat, working just in advance of the pull-boat, digs canals to give access to cypress where natural channels are lacking. Another method of logging is by the overhead skidder, in which the logs are brought in by a carriage traveling over a powerful cable suspended between the "head tree" and "tail tree," usually 600 feet apart. It is the general practice to girdle or "belt" cypress trees from 6 months to a year in advance of logging. The result is that about 95 per cent of the logs will float instead of 10 to 20 per cent.

About 1770, John Bartram planted a small cypress sapling which he is said to have pulled in the swamps of Florida and brought home in his saddle-bags. The tree has been dead for many years, but its skeleton still stands in Bartram's garden in Philadelphia. In the century and a quarter of its growth the tree attained a height of more than 150 feet and a diameter of 7 feet. The vitality of the bald cypress is illustrated by a tree which stands at the corner of 13th and Locust streets, Philadelphia. This tree is about 60 feet high and more than a foot in diameter, and is apparently in perfect health, although long exposed to the smoke and dust of the city. Except an opening less than 30 inches square, where the tree stands, every foot of soil the roots can reach is covered by brick sidewalks and asphalt paving. The trunk is unprotected and shows numerous scars where horses have gnawed it, but each time it has rapidly healed its wounds. It is surprising that any tree can maintain itself in thrifty condition under such extremely adverse conditions.

The attractiveness and vigor of bald cypress undoubtedly will cause it to be planted much more extensively for ornamental purposes than it has been up to the present time. It is hardy as far north as Massachusetts, New York and Michigan, and has no insect enemies. It should be planted in deep, fine sandy loam where moisture is plentiful and drainage good, if it is desired to secure rapid growth. It does fairly well in dry situations on the heavier soils and will also grow when planted in swamps or even in shallow ponds; in the latter case the roots send up the curious "knees." Bald cypress should also prove a valuable tree for commercial forest planting, especially on sites where it is too wet for other species to thrive. On a good class of hardwood soils, experience in Ohio seems to indicate that the tree will grow with sufficient rapidity to warrant its being used quite generally. Under cultivation the trees grow from 18 to 24 feet in height in the first 10 years. It is not difficult to raise the seedlings provided the seeds are soaked in water for about a month prior to sowing. They should be sowed about the middle of June and afterward the seed-bed should be kept mulched and well watered.

The wood of bald cypress ranks between white pine and the hard yellow pines in weight, strength and stiffness. The lumber shrinks and swells to a limited extent

and is moderately hard, straight-grained, and usually fine-textured. The color of the heartwood varies from light to dark brown or nearly black and gives rise to the common names of "red" and "black" cypress. The sapwood is white and decays rapidly. "White" cypress comes from trees which are mostly sapwood, and lacks the wonderful durability of "red" or "black" cypress. "Pecky" cypress is caused by a fungus which honeycombs the heartwood and eventually causes the tree to become hollow. This fungus works in any part of the tree but is most prevalent in the upper portions. The holes and pockets formed in the woody tissues weaken the lumber but appear to make it even more resistant to decay than the sound wood. The fungus which causes "pecky" cypress does not work in the sapwood, and so does not kill the tree, but because it weakens the heartwood the tops are often badly broken by storms.

THE LASTING QUALITY OF CYPRESS

This interesting testimonial to the durability of wood stands in the yard of St. Michael's Church, in Charleston, South Carolina. It is a head-board of heart cypress, erected in 1770, nearly 150 years ago. Marble tombstones often decay in less time. In all these years, the only repair has been the replacement of the post to the right in the photograph, which was necessitated because the original post was splintered by a shell from one of Gilmne's guns on Morris Island, fired during the siege of Charleston in 1863–1865. This chance shot split off the upper part of the head-board, on which was carved the words "In Memory." The outlines of the original letters cut into the wood are still perfectly sharp and clear, and the monument will apparently endure for many years to come.

Commercial Uses of Cypress

TEN years ago cypress was "lumber." It was used largely by the factory trade in the manufacture of wooden ware, doors and interior trim. Almost over night it ceased to be lumber, a piece of wood of specified dimensions, and became cypress, "The Wood Eternal." That descriptive title was coined when first it was decided to tell the public about the merits of cypress and came freshly minted from the phrase factory. It was apt and catchy. Cypress was the first wood to be advertised nationally. The work was taken up in a broad, constructive way. It was not suggested that home owners buy cypress and "make something, just anything you wish to make," but that definite plans for improving, beautifying or making the place more comfortable be adopted, and that cypress be used for the very specific and definite purposes for which it was recommended. The dominant idea was to interest home owners in the intelligent use of cypress. For these reasons a present-day consideration of the uses of cypress must take into account the intelligent manner in which the wood has been placed before the world's lumber-using public.

Going back into the history of wood, the investigator finds that the oldest doors in existence are made of cypress. They are now in a serviceable condition, although more than a thousand years old. Perhaps the youngest door in existence also is made of cypress, for the beauty of the wood is commanding the attention of the building trade. The significant fact is that both the modern and the ancient employed cypress to meet this exacting need, and no other purpose for which wood is used requires such absolute living up to expectations.

Selections of wood for use by those who invade a forested country are easily and quickly made. Hardy pioneers who clear away the forested area to the end that they may engage in agriculture examine carefully the relative condition of the "dead and down" timber. In the cypress section of the South the pioneers were quick to note the sound condition of the cypress that had laid on the ground for hundreds of years. They figured, as a matter of course, that if cypress would last almost indefinitely under such adverse conditions, it would be an excellent material to use in building homes, fences, barns and out-houses for themselves. Cypress, therefore, long has been the main dependence of the South for shingles, fencing material, residences and farm buildings in the country in which it grows. The product was greater than required for home consumption and naturally the manufacturers of cypress lumber reached out for other markets. Cypress shingles and cypress "shop" were marketed in northern centers of lumber consumption a quarter of a century ago. This invasion of the North was made possible by reason of the fact that cypress was cheap and, "lumber being lumber," it was possible to find an outlet for a part of the surplus of the southern mills.

This demand continued in an intermittent fashion, the quantity sold being governed largely by price competition. In the St. Louis market, for example, cypress was used extensively by manufacturers of interior trim. This condition arose during the transitory stage, 1898 to 1908, during which the main source of lumber supply shifted from the North to the South. The production of northern lumber decreased steadily during that decade and the output of southern lumber increased.

Co-incident with the increase in the territory in which cypress was marketed, there was a big gain in the price of cypress timber values. Locally, up to that time, the timber had been regarded as without value or of nominal value only. A certain "wise southerner" once upon a time unloaded a cypress swamp on an unsophisticated northerner for the unbelievably high price of $5 per acre.

A few years later the northern gentleman, who understood timber values, sold his "worthless swamp" for $75 an acre and the disgruntled man who originally had told with gusto how he had "soaked the smart alec from the North" brought suit but failed to recover. Twenty years ago cypress timber was valued at 50 cents and up to possibly $5 per acre. Now the stumpage is worth about $10 per thousand feet and some of the swamps are covered solidly with cypress and will produce 20,000 or more feet to the acre. The increase in timber values coupled with the heavy cost of logging and manufacturing necessitated the adoption of intelligent methods of marketing.

EARLY EGYPTIAN CYPRESS DOOR

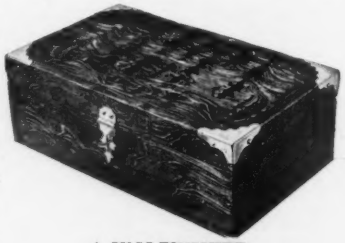
A demand sufficiently broad to take the product at a profitable price was demanded by the producer. The only way to assure that demand was to retain established trade and create a confidence in cypress that would increase the call for it for new uses. It was relatively easy to mentally arrive at that conclusion. It was a different and more difficult matter to work out the problem encountered. Those in charge of the work resorted to the first principles of merchandising, viz.: "It is easy to sell what people want." The real problem was to make them want cypress. Admittedly it was impossible to interest the public by advising its component members to buy cypress boards. However, the idea of buying a few cypress strips with which to make a trellis for a flowering vine to clamber over and increase the beauty of the premises aroused instant attention and brought immediate response.

NEW ORLEANS CYPRESS WATERPIPE
Laid in 1798. Removed in 1914.

There followed suggestions for pergolas, trellises, sleeping porches, arbors, garden benches and similar necessities and conveniences. Then came definite, tangible suggestions for bungalows, neat, comfortable, attractive homes instead of stiff, conventional enclosures, formerly called homes. The whole intent and purpose of this campaign of publicity on behalf of cypress was to educate the public to the advantages to be gained by the intelligent use of cypress in beautifying, adorning and improving their homes. The beauty of garden benches and trellises, the comfort and satisfaction derived from sleeping porches and pergolas, the idea of making a beautiful home as well as one that was comfortable, were intimately and indelibly linked in the public mind with the use of cypress.

The next step in the development of a permanent market was the suggested use of cypress in farm buildings. Plans of all manner of farm structures, residences, barns, implement-sheds, hog-houses, poultry-houses, sheep-pens, greenhouses, gates, fences, and other building equipment for the farm, were distributed to those interested. This was one of the first serious attempts made to interest the farmer in better buildings, and associated with the idea of the proper class of buildings was that of using wood that would be economical because of its durability. At the proper time came the idea of a cypress silo, made according to plans that permitted of the use of regular retail yard stock. Cypress was recommended because of its durability, that is, its ability to withstand the effects of alternate wetness and dryness, and because cypress is not adversely affected by the acids in the silage.

This was a step along the upward path in farm building and in the work of developing a market for the products of the cypress mills. A final touch was given when plans and instructions were issued for the construction of homemade furniture and knick-knacks, humidors, clothespresses, trays, and similar articles. Such articles, it was recommended, were to be given the famed "sugi," or Japanese drift-wood finish, using a blow-torch to char the soft portions of the wood and a wire brush to finish the work. Interesting thousands in the



A SUGI-FINISHED CYPRESS HUMIDOR

manufacture of presents for loved ones, and at the same time familiarizing them with the beauties of "sugi-finished" cypress, was a stroke in business diplomacy seldom equalled.

The outcome has been the discriminating use of "sugi" finish for trim, mantels and other interior woodwork. The word "discriminating" is used advisedly because that treatment is recommended and should be employed only where it is suitable. The outcome of applying intelligence to the problem of marketing cypress can be found in almost every village and hamlet in the United States and in thousands of markets and homes in foreign countries. Cypress is known, its merits appreciated, its uses understood.

In a complete and very interesting publication on the southern cypress (Bulletin 272, U. S. Department of Agriculture), is given the following comprehensive statement regarding its uses:

"Cypress has a great variety of uses, and for many of these it is selected as a preferred material. The key to its usefulness is its resistance to decay and other forms of deterioration when in contact with moisture, and its quality of being easily worked. It is used extensively for outside finish of buildings, such as siding, casing, sashes, doors and blinds, cornice, railings, steps and porch material. As a gutter stock, cypress outlasts many other materials and is in favor for high-grade work. Standard planing products consume large quantities of cypress. These include ceiling, siding, flooring, molding and finish. On account of its freedom from taste and great durability, it is a preferred material for tanks, vats, tubs, and wooden buckets. These are used for water storage, and by creameries, breweries, bakeries, dye works, distilleries, and soap and starch factories. In the construction of greenhouses, where wood is subjected to extremes of heat and moisture, cypress is used probably more than any other wood. It is also a leading wood for pumps, laundry appliances, caskets and coffins. Cypress is extensively used throughout the South in the construction of picket fences, which there remain the standard form of yard fence. In the moist, hot climate of the South, split cypress shingles have outlasted all other roofing materials commonly used, except the best grade of slate and tiles. While the ordinary sawed shingle is very durable, the relatively high value of cypress wood has resulted in cedar taking the lead as shingle material.

MODERN DOOR MADE OF CYPRESS

CYPRESS "PECK" BEAMS
In the living-room at Henry Ford's residence.

"More than two-thirds of the total cypress lumber output, estimated in round figures at 740,000,000 board feet in 1914, is further manufactured and utilized by the wood-manufacturing industries in the United States. The reports for 1911 show that 68 per cent (668,353,342 board feet) of the amount cut in that year was so used by these industries. The balance of the lumber cut goes into general use in the retail market.

"Relatively small amounts of cypress go into the primary products other than lumber. In 1911 the electric and steam railroads purchased cypress cross-ties to the number of approximately 5,800,000 or about 4.3 per cent of the total for the year. Only 72,995 cypress poles were reported purchased in 1911 by all the principal classes of pole consumers. Small amounts go into cross arms. A little is used for slack cooperage, and, experimentally, cypress has been found to be a substitute for white oak for wine barrels."

Cypress wood contains a natural oil which apparently checks the action of decay in much the same way that creosote does when injected into ties. Cypress heartwood has been known to outlast stone, iron and cement. In

A SLEEPING-PORCH OF CYPRESS

South Carolina a cypress grave-marker was so well preserved after 140 years' exposure to the weather that the letters could be easily read. A still greater life is claimed for cypress coffins at Charleston, South Carolina, which were found sound at the time of the earthquake, though put in the ground in 1678. Roofs of cypress shingles withstand centuries of exposure. There is record of one roof still serviceable after 250 years; of another lasting 228 years; and of a third where the roof is still good after 200 years. A roof of cypress shingles placed on Mount Vernon in 1743 while Washington was alive, was removed in 1913. Waterpipe laid in New Orleans in 1798 was sound when dug up in 1914. There are a number of records of cypress railroad ties still in use after 30, and even 40 years. Cypress ties, either with or without tie plates, hold second place in the order of merit, according to a table of comparative values of ties published by the American Railway Engineering Association. Railroads that have used cypress ties report favorably as to their lasting qualities wherever they were manufactured from heartwood. "White" or sap cypress makes excellent ties when treated with creosote. Cypress is especially adapted for tie use in trolley lines and branch lines of railroads.

GREENHOUSE BUILT OF CYPRESS

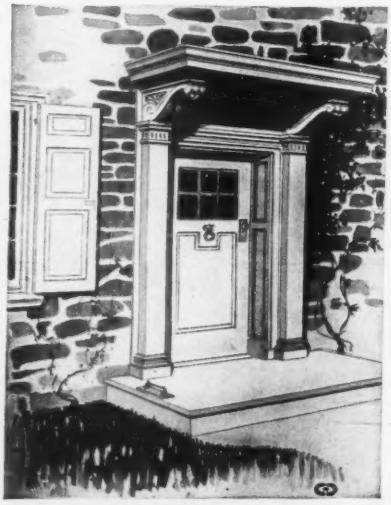
Cypress "knees" are utilized for hanging baskets for vines and flowers and they also make excellent bird houses. The "knees" have also been used for beehives. The negroes made a salve from the resin found in the bark and cones of cypress. In the early days of the South, cypress was the best canoe wood where yellow poplar could not be obtained. There is a record of a cypress canoe, 30 feet long and 5 feet wide, that would carry a load of more than 6 tons.

The factory demand for cypress is not of recent development. In catering to this trade the cypress manufacturers adopted the original policy of ascertaining the sizes and grades of material their customers require; then making an earnest and successful effort to furnish exactly what was needed.

Consequently in various small manufactured articles cypress lumber has been more closely utilized than any other kind, with the possible exception of white pine. Ten years ago the "pony mill," equipped to work up slabs and edgings, was an adjunct of many of the plants in the South. These mills took the offal of the main plant and converted it into stock of the sizes required by manufacturers of many products made of wood. This stock was four foot and under length and of such widths and thickness as could be used or cut to advantage. Rough lumber for the manufacture of pails, casks, washing machines, machine parts and miscellaneous wooden ware was produced in the approximate sizes required by the customer. In this way a market was created for those portions of the log which ordinarily are used for fuel or employed to fill in low spots about the saw-mill premises.

Those who casually read the list of products made of cypress may gain the erroneous idea that this wood safely may be employed for any purpose for which wood is desired. That idea has never been encouraged by those responsible for the development of the demand for cypress. "Use cypress in preference to other woods for the purposes for which we recommend it," is the advice given, and coupled with that is the following: "Secure the best information you can regarding the kind of wood to use for the purposes for which cypress is not recommended." Going a step farther in this direction, the direct, explicit command has been given "not to use cypress unless you are convinced it is the best material for the work you contemplate doing."

Way back in the dawn of settlement in the South, the pioneer built his shack, his barn, his fences, made his boats and parts of his vehicles, of cypress, and possibly was buried in a rough cypress coffin. He selected cypress because he found it was easy to work and would not rot. With the rived shingles from straight-grained bolts, he covered his buildings, and some of the structures with the original covering intact and still 100 per



AN ATTRACTIVE CYPRESS DOORWAY

TYPES OF FARM BUILDINGS FOR WHICH CYPRESS IS PARTICULARLY DESIRABLE

cent efficient remain monuments to his industry and somewhat hasty notions of architecture. The story of cypress values and cypress uses is being told every day on the farm, in the suburb, in the city home and in the thousands of factories whose products call for the use of wood upon which dependence may be placed.

BOY SCOUTS IN CITY PARK WORK

By H. H. Tryon

Instructor in Forest Utilization, New York State College of Forestry

THE Park Commission of Syracuse, New York, had for some time been confronted with the problem of how to develop Westminster Hill, a steep little knoll located in the University Hill residence section and which, on account of its topography, is not suitable for building purposes. A solution was found by enlisting the help of local Boy Scouts and the New York State College of Forestry. Five thousand forest trees were supplied from the College nursery; these were chiefly red and white pine, twice transplanted, with about 300 Norway spruce, also twice transplanted. This stock was brought in from the nursery the night before and was wheeled in near the scene of action. In the morning, 75 Scouts began the work of foresting the slopes of this hill. Mr. S. W. Allen of the Forestry College was in charge, assisted by several other members of the Forestry faculty.

The spruce was put in in a border along the base of the hill to insure its having a generous supply of moisture, while the upper area was filled in with the red and white pine. At the suggestion of the Park Commissioner, the trees were not planted in rows but an irregular arrangement was followed, care being taken that spacing was always from 5 to 6 feet. The scattering or "shot-gun" scheme of planting, such as this, was, of course, adopted in view of the fact that the plantation was not being set out for any commercial purpose but rather for its future value as a playground and recreation park.

The method of planting was the usual one; mattocks were used to dig the holes, the sod being first scraped off. The bulk of the Scouts were detailed in crews of two, one to dig and one to plant. The remainder were apportioned to "puddling" the trees, keeping the planters supplied with stock, and last but not least, a small detachment was kept busy bringing fresh water for the thirsty ones.

At noon work was stopped and the Scouts divided into groups, each one with a small cooking fire at its center, by means of which they prepared their meats, roasted their potatoes, made cocoa, etc. For a short time after dinner, Scout games were played, then planting was resumed until all the area was covered. It is safe to say that these few hours of labor have assured to Syracuse at some future date an attractive wooded park in the center of one of its principal residence districts. Those who planted the trees expect that at least 70 per cent will survive; and if grass fires can be kept out, the existence is assured of a grove of trees whose intrinsic value will be inestimable.

BOY SCOUTS PLANTING A HILLSIDE

Syracuse, New York, solved the problem of how to develop a steep hill overlooking the city by getting the Boy Scouts to plant it with red and white pine and Norway spruce.

DYES FROM ORANGE WOOD

DUE to the investigations of the Forest Products Laboratory at Madison, Wisconsin, the manufacture of dyes from the waste of osage orange wood has become a commercial success. Carloads of the wood are now being shipped to eastern extract plants from Oklahoma and the dye is now produced at the rate of about $750,000 per year. Previous to the establishment of this industry, the waste of the osage orange wood had no market value and the extract plants were importing dye woods from Mexico and Central America at a very high cost.

Crater Lake National Park

By Mark Daniels
Former Superintendent of National Parks

MANY people whose repugnance for platitudes is not sufficiently strong to prevail against their indifference to the value of an extensive vocabulary will describe Crater Lake as the eighth wonder of the world and let it go at that. To many others, myself included, it is the whole eight, and then some, if one may be permitted to resort to the more expressive vernacular. The sight of it fills one with more conflicting emotions than any other scene with which I am familiar. It is at once weird, fascinating, enchanting, repellent, of exquisite beauty and at times terrifying in its austere dignity and oppressing stillness. In the sparkling sunlight, its iridescent hues are dazzling and bewildering. When a storm is on, it throws terror into the heart of the observer and carries the mind back through the eons when it was born in Titan throes of nature. There are a few other crater lakes in the world. In India, Hawaii and Italy there are some; perhaps there are others in other lands, but there is none known to man that can remotely approximate the transcendant beauty of Crater Lake in Crater Lake National Park.

To appreciate how one might be so profoundly impressed by a visit to the Lake, it is necessary to know something of the country and its formation. The Cascade Range of mountains in southern Oregon, in the vicinity of Crater Lake National Park, forms a more or less broad plateau, broken here and there by peaks and volcanic cones that tower above the surrounding territory. Of these majestic mountains, Shasta, Hood and Mount Rainier form the three most striking and distinctive peaks. At one time, however, many thousands of years ago, Mount Mazama was probably as high and as distinctive in appearance as Mount Rainier. Long before any human being ever set eyes upon the Peak, however, the top

A BEAUTIFUL VIEW OF CRATER LAKE

Wherever there is a patch of firm soil, trees will be found growing. From the rim and points lower down, views of the Lake and the tawny cliffs beyond make a wonderful background, against which the deep greens of the pines and cedars are silhouetted.

broke through and sank into a great subterranean chasm beneath the mountain, leaving the cup, which now contains Crater Lake, to be filled with the waters of springs and melting snows. As the volcanic fires of Mount Mazama gradually cooled and finally ceased, the great basin was filled to its depth of two thousand feet with water which has, during the ages, taken on a blue, the hue of which is deeper and more intense than the blue of the Bay of Naples.

There is no inlet to the Lake nor is there any surface outlet. It is supposed that the waters escape by underground channels and contribute their bit to the flow of the Klamath River, but whether this may be so or not, the average annual level of the surface of the Lake remains substantially constant. The water level is at an elevation of sixty-one hundred and seventy-seven feet above the sea and the mirror-like surface is unbroken except for Wizard Island and a jagged bit of rock called the "Phantom Ship." The Lake is between five and six miles in diameter and almost circular in form. The surrounding rim is as near vertical as the soil can stand and towers from eight hundred feet to eighteen hundred feet above the water surface.

The reason that Crater Lake leaves such a lasting impression is largely due to the way it bursts upon the view. All the way from the railroad station to the Crater's rim the road climbs and climbs with the objective ever far above and out of sight. When the motor stage finally pulls up at Crater Lake Lodge, the entire panorama bursts into view with a theatrical suddenness and presents such a striking contrast to anything that has been seen en route that it takes some time to readjust the faculties. The approach to the Lake is almost calculated to bring the mental attitude of the tourist to a condition that is most susceptible to the suddenness of the change of scene.

There are two main routes which may be traveled in entering and departing from the Park, one by the southern entrance by the way of Klamath Falls and Chiloquin, and the other by Medford through the western entrance. These two routes make it practical to enter the Park, traverse it, and depart while en route either north or south between San Francisco and Portland or Seattle. In this respect, a visit to the Park may be taken, without seriously interrupting the travel, much in the same way that one may enter Glacier Park, traverse it, and emerge at another station on the line of the Great Northern. Northward bound, the tourist may leave the main line of the Southern Pacific at Weed and take the branch road

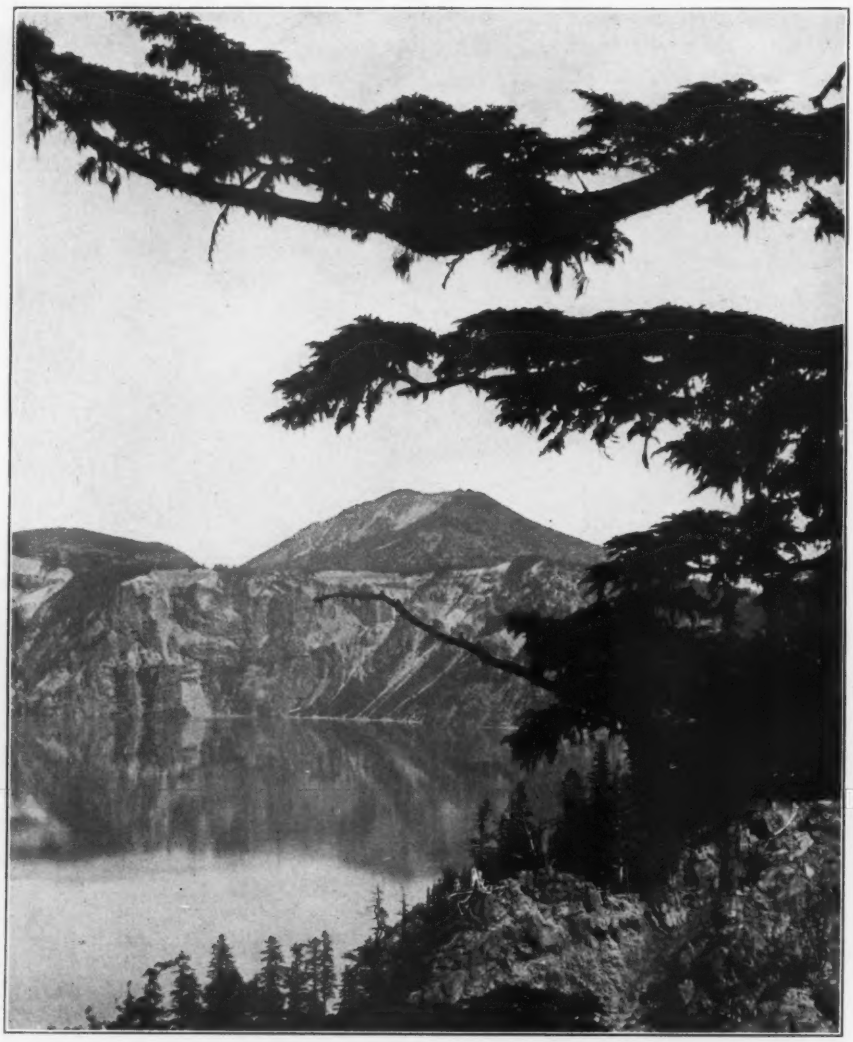
HERE IS REACHED PERFECTION IN REFLECTIONS

As Joaquin Miller says, when the surface of the Lake is undisturbed, it is difficult to distinguish the reflection of the cliffs from the cliffs themselves. The perfection of these reflections is due not only to the surface of the water, but to the curious intense blue which seems to give it more of a mirror-like quality.

along the wonderful Klamath Lake to Chiloquin. From Chiloquin a motor stage will carry him to and through the Park and out by the Medford road. At Medford, on the main line of the Southern Pacific, he may continue his northward journey. The south-bound passengers may take just the reverse route.

In times gone by, not so many years ago, despite the fact that officials of the Southern Pacific Company place the date in the Dark Ages, the northward bound passengers visiting Crater Lake National Park were accorded the privilege of waiting four hours at Weed, where the sun daily gives evidence of its ability to raise blisters and remove outer layers of skin without human aid. The train from Weed on the branch line to Klamath Falls and Chiloquin would, in those days, start out in the cool of the evening from Weed and leave the traveler either at the town of Klamath Falls or Chiloquin for the night. This unnecessary delay at Weed has since been eliminated and the traveler is given some opportunity to see the wonderful Klamath Lake before the evening shadows set in. Whether this change in schedule has been due to the subtle sarcasm of the free-spoken among the travelers who suffered this long delay or whether Mr. E. O. McCormick, vice-president of the railroad company, has again succumbed to his natural tendency to do the best he can for the traveling public on his railroad, is difficult to say. In extenuation of the latter's case, however, it may be only just to say that the substitution of oil for coal as a fuel on the Southern Pacific is largely due to his efforts, and it is to be hoped that the votes of thanks from those who wish to enjoy the scenery without the obstruction of cinders in the eye may offset the curses of the oculists who formerly thrived along this line when coal was used.

If the stop is made at Klamath Falls, it is possible to take a most wonderful ride along the western shores of Upper Klamath Lake, some twenty miles in extent, to Harriman Lodge and Pelican Bay. I have known few people who have chosen this route who did not stay a night at Harriman Lodge.



TREES AND ROCKS AND WATER AT CRATER LAKE

Even the trees of the vicinity take on characteristics of the rugged Crater. They seem to throw their branches out in picturesque lines that make perfect composition with the broken and jagged cliffs.

From Harriman Lodge the road to Fort Klamath passes through some wonderful forests and charming scenery. From Fort Klamath it follows along the western side of Anna Creek and enters the Park at the intersection of the Anna Creek canyon with the southern boundary line. From the southern entrance for about five miles the road follows the rim of the canyon and discloses at almost every turn wonderful glimpses of the canyon walls and the stream several hundred feet below.

The snows cling to the higher levels around the rim of the canyon for so long a period that at times it is difficult to drive to the rim until quite late in the season. As a result it has been necessary to establish the Park headquarters at a place called Anna Spring which is at an elevation of six thousand feet above the sea. The headquarters here are at the junction of the Medford

road and the Anna Creek road. From the Superintendent's office to the rim of the Crater, the road climbs through a difference in elevation of a little over one thousand feet and lands the passenger at the very door of the Crater Lake Lodge on the rim. Throughout the entire trip the colors have been the sombre shades of our Oregon forests and the rich browns of the fields, but from the rim an entirely different color scheme bursts upon the view.

The color of the water is a blue that defies description. It is of a sapphire shade and yet seems to be translucent and sparkling. The cliffs that form the rim are of rich browns and tawny yellows, spotted here and there with deep reds. At the edge of the Lake, in places where the water is shallow, the yellow of the lava beneath shows through the blue of the water and gives this sapphire sea a border trim of pale jade green against which the deep rich green of the cedars and pines is brought out in most startling contrast. A friend who just returned from there told me that he was never so thrilled with conflicting emotions as at the moment he first stood upon the rim of the Crater.

A GIANT ARROWHEAD

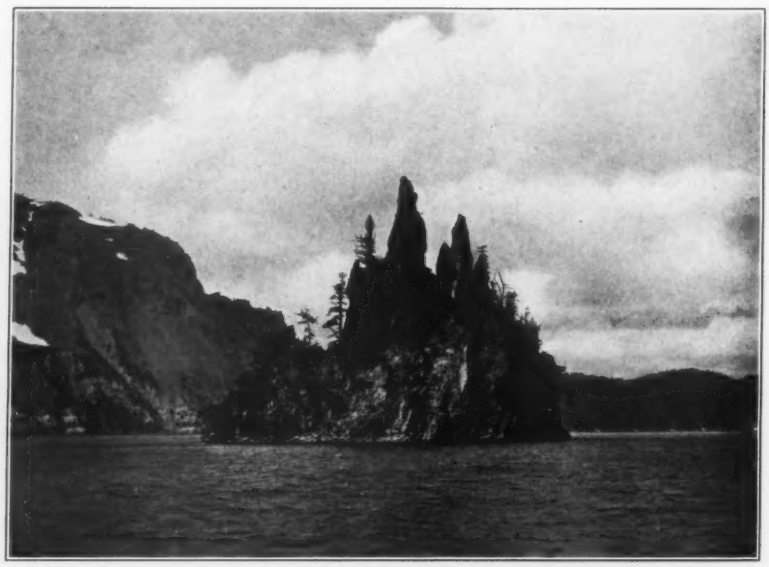
There is a comparatively small and jagged rock projecting above the glass-like surface of the Lake, which, at certain angles, takes on the aspect of a great ship. Combined with its reflection, which at times is difficult to distinguish from the rock itself, it looks like a giant arrowhead. The picture here shown is taken from a point on the eastern rim and looks toward the Vidæ Cliffs.

Nearby stood a small boy, who, just as my friend secured a vantage point, loosened a stone that went rattling down its fourteen-hundred-foot journey to the water below. My friend is a great lover of children, but he said that at that moment he had a burning desire to throw the small boy after the stone. First he wanted to leave the place, for he felt that all human things were strangely out of harmony with the scene. Then he felt a sudden and ardent desire to rush down the steep precipice and bathe in the magic waters of the Lake. Then he felt sick and then hungry. He never told me the entire gamut of his emotions nor which one he finally succumbed to, but I am inclined to believe, from my knowledge of his habits, that hunger won out and he finally wound up with a mess of crisp trout from the Lake.

Of all places to fish in still water, there is probably none that equals Crater Lake. The water, despite its deep blue color, is astonishingly clear, and objects may be seen on the bottom of the Lake, in places where it is shallow, forty or fifty feet below. Around the rim there is no form of plant or tree life that may entangle the line or catch the hook of the unskilled fisherman. One may stand on the brink of the Lake and cast, without fear of snares, for the trout which may be frequently seen in the depths below. On a still day the wily fish may be seen to dart from the deep shadows behind some boulder and rise like a flash to strike at the fly on the surface. If the angler is sufficiently skilful to fasten the hook firmly, he will see every move of the fish in his struggles for escape. The trout in the Lake are mostly rainbow and of considerable size, varying from a half pound to four pounds in weight, and they are plentiful in number. The average weight, I would say, is in the neighborhood of one and a half pounds. The work of landing them is, therefore, something of a task, for they put up a beautiful fight. Anyone who has not enjoyed the experience of being able to see every move of a two- or three-pound rainbow trout while he is being landed has not enjoyed to the full the fascinating sport of angling.

The lure of the Lake below frequently tempts inexperienced travelers to make the descent in the afternoon as soon as they have changed and refreshed themselves after the stage ride. Until the new trail was built last

year leading from the rim to the water's edge, such careless little trips frequently proved disastrous, for the return climb was then very arduous, covering as it did nearly a thousand feet of difference in elevation. Standing on the rim, the descent to the Lake seems to be little more than a short walk of ten or fifteen minutes. Coming back over a poorly-constructed trail, the thousand-foot climb lengthens in a most astounding manner. One of the first steps taken, when the measures of Secretary Lane were adopted for the development of the Parks, was the construction of a practical trail on easy grade from the rim of the crater to the water's edge. This is now complete and greatly reduces the labor of the trip, although the climb is still much more than it seems.



"THE PHANTOM SHIP"

A close view shows its rugged outline and mast-like rocks. From this position, however, the similarity to a ship is not so readily visible.

Crater Lake has been more successful, considering its area, than other parks in the system in securing appropriations from Congress for its improvement and development. Congress is committed to a plan for building an encircling highway around the rim of the Lake as close to the brink as practical construction will admit. The two roads, one from the southern entrance and one from the western entrance, which are now completed, are a part of the road scheme for the development of the Park to which Congress has given its consent. Whether the Appropriation Committee was caught in a moment of mental aberration when this plan was put through, or whether they were led to see the light which again seems to them so dim, cannot be definitely ascertained, but the people of southern Oregon, and, in fact, all who love the scenery of our country, are particularly grateful and delighted over the fact that Crater Lake will soon present a wonderful field for motor touring.

After the journey from the railroad station to the Lake has been successfully weathered, there is quite enough of interest, not only in the scenery immediately about the Lake and crater rim, but in other parts of the Park, to justify a stay of several days. A good motorboat is kept at the landing down on the Lake's edge, and a trip around the borders of the Lake in this boat is perhaps one of the most fascinating experiences that can be had. The boat passes around jagged points of sharp rock, under the shadows of beetling cliffs and out into the sunlight again in a way that makes one feel as if fairyland were really true. In places where the water is not more than thirty or forty feet deep, the jade-green lava at the bottom can be clearly seen. In other places the boat over the rim of the inner crater, and the suddenness with which the bottom seems to drop out of things, is breath-taking. The trip around the border of the Lake is some twenty-four miles in length and every foot of it is full of fascinating interest. A very popular way of spending a little time at the Lake is the trip to Wizard Island and a stay there over night.

WIZARD ISLAND, CRATER LAKE

This is the cone of a secondary crater that was thrown up in the great cup formed by the fall of Mount Mazama, at least so the authorities of civilization say. The Indians, however, still hold steadfast to the belief that it is the head of the great god Llao.

Wizard Island is about three-quarters

of a mile in length and one-half mile in width and its top is approximately eight hundred feet above the surface of the Lake. Geologists and others who read the story of the world's history in stones and formations and things say that Wizard Island is the remains of a secondary cone that was built up in the great crater. It is partially covered with pines and presents a somewhat weird and desolate aspect when viewed from the rim. The lack of trees on the top gives it a bald appearance that suggests the possibility that Llao, the mythological character whose head the Indians supposed the Island to be, might have belonged to some Christian religious order.

Klamath and Modoc Indians in the old days believed that Mazama and the surrounding country comprised the home of the good god Llao. To fight his battles he had a tribe of great crawfish which kept the rim of the Lake clear of curious investigators by reaching out of the water with their claws and snuffing out their lives much as the Japanese snuff the wicks of their candles with copper pinchers.

Nearby was another god, named Skell, who was lord of the marshes of Klamath. As is usual, when two gods get close enough to develop any degree of intimacy, war broke out between Llao and Skell. Llao, in a fit of playfulness, carved out the heart of Skell and tossed it to his monster crawfish, who used it to play ball with. Skell, however, had many faithful servants, such as eagles, bears and deer, and one day an eagle secured Skell's heart in flight and passed it on to a deer, who ran away with it. Skell's body then grew around his living heart again until he became whole, and stronger than ever, thus disproving the modern contention that a man can't come back. When he was recovered from his wounds, if removal of all the body except the heart can be described as wounds, he started the scrap all over again, and this time captured Llao and tore his body into fragments on the top of the cliffs of Crater Lake. When he threw the fragments into the Lake, they were eaten by Llao's own monster crawfish, who thought, of course, that it was Skell's body, but when the head was thrown in, they recognized their mistake and refused to eat it, escaping by a narrow margin the everlasting stigma of being termed wilful cannibals. Wizard Island is Llao's head, and every Indian who knows the legendry of his tribe will prove it to you, because just to the north of the Island and a little to the east is Llao's rock, which towers almost nineteen hundred feet above the water's surface, and no one could wish for better proof than that, for it was from Llao's rock that the head was tossed into the Lake.

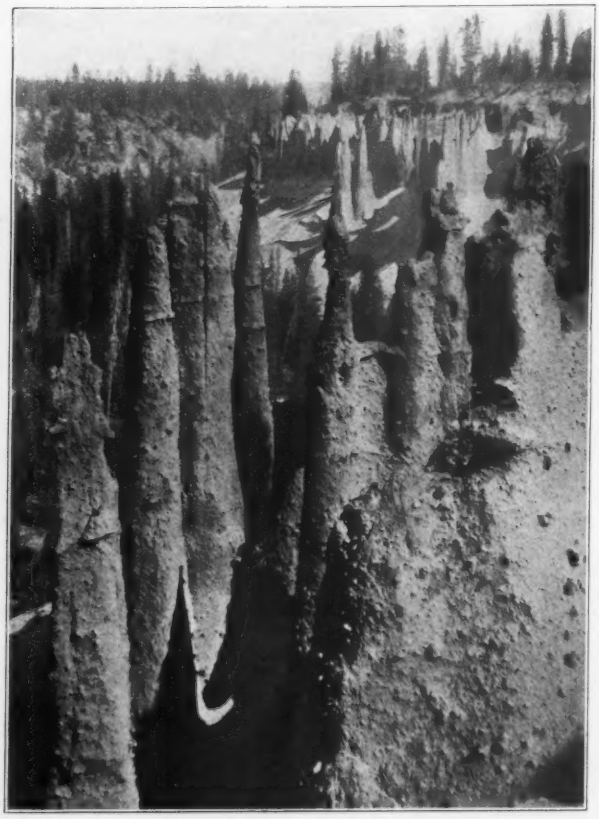
THE SENTINEL IN CRATER LAKE

The bottom of the Lake in most places pitches off at such a steep angle that it is quite possible for the motor-boat to hug in close to the surrounding rocks and cliffs. This remaining sentinel of a by-gone period is invariably visited by the motor-boat.

The trips of interest in the Park are not confined to the Lake itself. There are the Anna Creek Canyon, which is well worth investigating, the climb of Scott Peak for a view, and the Pinnacles in the Sand Creek Canyon. These Pinnacles are rugged, towering cones that project like stalagmites from the floor of the canyon or from the lower slopes to the walls, that remind one somewhat of the formations that are so common in Yellowstone. The Pinnacles are almost at the eastern border of the Park in the upper portion of the Sand Creek Canyon. Sand Creek heads in Anderson Spring near the upper end of Kerr Valley and joins Wheeler Creek just outside the Park. It has one tributary just inside the Park, the headwaters of which are on the south slope of Scott Peak. Here is a wonderful collection of names given to some of the interesting places that cluster around the base of what was once the Great Mount Mazama. In addition to these, we have Dutton Cliff, Dutton Ridge, Scott Bluffs, Anna Creek, Ragged Crest (which is really the name of a portion of the rim) and a great many other similarly inspiring names that testify to the quality of intelligence possessed by those who had the naming of these places.

Continuing the trip as it was begun, namely by entering from the south, that portion of the road lying between the Park Headquarters and lodge must be retraced. From the lodge there is a beautiful stretch of road following down the comparatively gentle slopes of the plateau through a forest of pine, fir and cedar, nearly all the way to Medford, Oregon. There are few motor trips in this country that are equal to the drive down this road to Medford, which is somewhere in the neighborhood of eighty miles from the Lake. The course of the road is

substantially westward, and in the afternoon the play of the shadows and the light of the setting sun is truly a spectacle to behold. The road traverses gentle slopes and long stretches of forest-covered meadow-land where the traveler is constantly between the twilight walls, and then bursts out suddenly on to a slight eminence where the



THE PINNACLES

These are in the Sand Creek Canyon. They are stalagmites that tower above their bases near the bottom of the Canyon to the very rim. They are perhaps as interesting as anything that may be found in Crater Lake National Park outside the Crater's rim.

full red disc can be seen hovering over the tops of the green forests that stretch indefinitely into the distance.

Whether the construction of the new cut-off of the Southern Pacific, which will give an entrance to the Park on the east that will be very much closer to the Lake, will keep many from taking this wonderful drive, is a question, but, no doubt, it will. Nevertheless, if I ever take another trip to Crater Lake, one of the features of the journey to which I will look forward will be the ride from the crater rim in the afternoon down the slopes of the great plateau to Medford.

After all is said and done, the task of writing a description of Crater Lake is one that should be essayed only by master hands at description. A sentence in the account of J. W. Hillman, who was the leader of a combined party of Californians and Oregonians who discovered the Lake, gives an excellent idea of the suddenness with which it bursts on the view. He writes: "Suddenly we came in sight of water. We were much surprised, as we did not expect to see any lakes and did not know but that we had come in sight of and close to Klamath Lake. Not until my mule stopped within a few feet of Crater Lake did I look down, and if I had been riding a blind mule, I firmly believe I would have ridden over the edge to death." Joaquin Miller, the "Poet of the Sierras," has described the impressions engendered by the Lake perhaps as briefly and potently as any. He says: "The Lake? The Sea of Silence? Ah, yes, I had forgotten—so much else; besides, I should like to let it alone, say nothing. It took such hold on my heart, so unlike Yosemite, Yellowstone, Grand Canyon, when first seen, that I love it almost like one of my own family. But fancy a sea of sapphire set around by a compact circle of the great grizzly rock of Yosemite. It does not seem so sublime at first, but the mote is in your eye. It is great, great; but it takes you days to see how great. It lies 2,000 feet under your feet, and as it reflects its walls so perfectly that you cannot tell the wall from the reflection in the intensely blue water you have a continuous unbroken circular wall of 24 miles to contemplate at a glance, all of which lies 2,000 feet, and seems to lie 4,000 feet, below. Yet so bright, so intensely blue is the lake that it seems at times, from some points of view, to lift right in your face."

Crater Lake has not enjoyed the fullest attention, appreciation and knowledge of its beauties that its unique distinctiveness justifies, but if ever the Federal Government gets the present well-planned campaign of publicity for its scenic areas thoroughly under way, this Park is destined to be the mecca of scenery-loving tourists.

A GLOWING TRIBUTE

MR. C. F. Williams, of the Royal Mint at Sydney, Australia, writing Mr. Charles Lathrop Pack, President of the American Forestry Association, says:—

"I must again pay a compliment to the publishers of AMERICAN FORESTRY which a friend has so kindly sent me. It is a grand production, which speaks volumes for the photographer responsible for such wonderfully fine samples of the photographic art; indeed, one might with justice say, 'it is a scientific story of a gloriously interesting subject, told most eloquently in the best approved style.' I was further deeply interested in your remarks, under the heading 'Preparedness and Forest Products,' if you will permit me to say so? I believe the American Forestry Association, as well as all true Americans interested in the future welfare of their country, owe you a debt of gratitude for the splendid advice contained in your remarks under that heading which were, and are, admirably put without wasting words. It is up to all interested to seize the opportunity now at hand."

THE State of Pennsylvania has started a new attack on the chestnut blight, the white pine blister rust and other tree diseases by going to Wisconsin to engage J. G. Sanders, Wisconsin State Entomologist, whose first step for the eradication of the white pine rust in Wisconsin was to destroy all the trees and berry bushes on the island where the disease was found.

Fighting a Forest Fire

By James Brown, *Forest Clerk*

THE hot, dry weather which prevailed in the timbered portions of Arizona and New Mexico throughout the spring and summer has been very disastrous in the way of forest fires. The National Forests, dry as tinder, with high winds blowing every day, required only a lighted match or cigarette to start huge conflagrations.

This one happened on a lonely trail in the Horsethief Basin country of the Prescott Forest. On a Friday smoke commenced boiling up from one of the rocky, tree-covered canyons. It was quickly spotted by the Forest Service lookout men from high peaks for miles around, and a forest ranger with a crew of six men was soon at the fire. They fought the fire all day and night and thought they had it under control. Saturday night, however, a strong wind came up and whipped the fire in all directions. More men were hurried to the fire line, but Sunday a fiercer wind sprang up and the fire got away in four directions, burning up the mountain sides like millions of Turkish cigarettes. A hundred men were rushed from the mining town of Crown King to the fire lines. Sunday night, Monday and Monday night it was a hard battle between the men and the crackling flames for mastery. Scores of men never left the fire lines except for meals.

THE FIRE STARTING

View of the fire on the Prescott National Forest, Arizona, soon after it was discovered by the Forest Service fire lookouts. A brisk wind caused the fire to spread rapidly.

Equipped with rakes and shovels, some of the fighters cleared fire lanes to head off the fire, while brawny men from the mines leaped inside the lanes and felled trees which were liable to throw sparks beyond the lines. Back fires were started at favorable points and the fire was fought back "blaze against blaze." By Tuesday night it was under control.

It was of interest to note the different types of men who responded to save Uncle Sam's timber from the flames—adventurers, cowboys, miners, railroaders, mine owners, clerks and a lone preacher. One chap on the fire line was a college man from Chicago, roughing it as a cowboy. An assistant cook was a baritone singer and pianist. Several Mexicans, carrying fine army blankets and silver spurs wrapped in their beds, had probably drifted up from the border—ex-Villa soldiers? One adventurer was a veteran of the Boer War, a strapping six-foot, sunburnt American who seemed absolutely tireless. He fought the fire from Friday night to the following Wednesday night, sleeping only ten hours the whole time. He was a type of the American adventurer all over, from his easy swinging gait to the cool nonchalance he showed under the strongest excitement. The forest ranger, quick to recognize a kindred spirit, had made him foreman of the crew who were fighting the fire at the most dangerous point. One time the wind whipped the fire up into the crown of the trees. The Mexicans at this point of the fire line left their tools and ran in terror as the tongues of flame shot up through the rolling smoke. The forest ranger and the Boer War veteran dashed into the smoke to bring out the tools and fell over a Mexican lying on the ground, overcome with smoke. They dragged him to safety.

The country was exceedingly rough and broken, and, while patrolling the fire lines, the ranger's horse fell with him and he was painfully injured. However, in spite of his injuries, he stayed on the job until his swollen muscles would no longer carry him. It was worth the effort. One of the mournful sights to a person who loves the forests is to ride over a burned area—nothing but blackened, fire-killed pines.

"Still stands Thine ancient timbered aisles,
Once forest green, now smoking burn."

The Horsethief fire, however, had its cheering feature. While the area burned over was large, it was only a tithe of the acres of tall pines which were saved. Had the spreading flames been allowed to burn unchecked, the green country for miles around would have been a desolate wilderness.

5,000 MORE MEMBERS

We wish 5,000 more members this year.

We urge our members to nominate friends for membership.

War Consuming Britain's Forests

THE lumber needs of Great Britain, due to the unprecedented demands of the war, and with supplies from most other European countries cut off, are so great that many of England's and Scotland's fine old forests, many of her parks and the estates of private owners are now being denuded of trees. The cutting and the lumbering are being done by a Canadian Forestry Battalion, the 224th, and by Irish and Portuguese timbermen, while two more battalions, the 238th and the 246th, are now being recruited in Canada for service both in England and in France.

The 224th Forestry Battalion is doing most of its work in the north of Scotland, cutting Scottish pine. There is a company at work in the royal park at Windsor Castle, cutting trees there, and a third company at New Forest in Hampshire.

Eight sawmills have been sent over from Canada to England, six for the 224th Forestry Battalion and two for the forestry committee in England which has supervision over lumbering operations there during the war. They are mills typical of the Canadian lumbering industry and are generally known in Canada as portable mills. They are entirely new to the British Isles and their great efficiency is said to be causing much interest. They have each a capacity of 15,000 to 20,000 feet a day and include the edger, slash saw, saws for making railway ties, etc., in addition to their big 56-inch circular saw. They have 40-horsepower locomotive boilers.

224TH CANADIAN FORESTRY BATTALION

The hardy woodsmen of this contingent of Great Britain's army were recruited in the lumber camps of Canada, and the men are now at work in the forests of England. Two similar battalions are now being organized.

The extent of the cutting is described by a London correspondent who says:

"Not even in the days of the Armada and the wooden walls of England was there such a tree felling as is now going on in Great Britain. In every wood the sound of the axe and the saw can be heard and lumber camps as picturesque as any on the Missouri are to be found as far apart as the Scotch fir woods and the Windsor and New forests, where the Canadian lumbermen are working. Behind the statement of Mr. Acland in the House of Commons that the Home Grown Timber Committee had been successful in securing supplies, there lies a story of one of the best efforts that has been made by any Government department to meet the present war emergency.

"The emergency work of the committee has included not only the importation of Canadian lumbermen, but the importation of Irishmen and even of Portuguese who are now employed in cutting pit props to supply the Welsh coal fields.

"By an order in Council under the Defence of the Realm Act, the committee has been empowered to commandeer all the timber resources of the country, but so far their action has been limited to negotiation with the landowners, who, Mr. Acland says, 'have met them most fairly.' This step was rendered necessary by the fact that the Government had no large supply under its own control. Britain was not alone in failing to anticipate the consumption of timber which war would entail. In none of the belligerent countries, not even in Germany, had a proper estimate been made of the demand that would arise for ash wood for wagons, for fir for trench work, for woods for hutments and for the thousand other needs of the army.

"There remains, however, this difference, that Germany and the other countries had their supplies at hand in the best possible condition of storage—in their forests—while the British even now, when tonnage has become so important a factor in the war, are importing some six or seven million cubic feet of timber each week. If in these circumstances the German submarine warfare had been more successful, there would have been necessary a wholesale destruction of British forests which would have laid England bare for a generation.

"Now much is being done to use Britain's own natural resources, and much more will probably be done during next winter, if the war lasts as long. Some definite plan must at once be laid down for afforestation after the war, and the three essential things the Government at that time must be certain about are, where to plant, what to plant and whether they have got the plants to carry out the scheme. Of these three the last comes first.

"The plants must be ready when the labor released after the war is available, and here a little war time discovery on the part of the committee is worth mention. They have discovered that Scotch fir makes better railway

sleepers than imported pitch pine."

Of the Canadian contingent the *London Times* says:

"If you would know the lumberman of Canada and how he works, go to the edge of Windsor Great Park, where the cross-road from Virginia Water Station strikes the main road between Egham and Sunningdale. There, on the Clock Case Plantation, you will see over 150 men of the 224th Canadian Forestry Battalion converting trees into railway sleepers and boards at the rate of anything from 15,000 to 20,000 board feet a day.

CANADIAN SOLDIERS FELLING TREES IN WINDSOR FOREST

The English are much impressed with the vigor and the skill of this overseas battalion, composed, as it is, of experienced lumbermen from all sections of Canada.

"The plantation, which forms part of the lands owned by the Crown and administered by the Commissioners of Woods and Forests, included a considerable area covered with spruce, fir, Scots pine, and larch, with an undergrowth of chestnut. Not very long ago a party of experts looked at the trees with the dispassionate measuring eye of the undertaker, and gave it as their opinion that from this wood it was possible to get 3,000,000 board feet of timber. Today whole tracts of it have been swept clear by the axe, and the quaint square tower of the old royal lodge, which stands deep-set in the wood, and which, so the story goes, by its resemblance to the case of a grandfather's clock gave the plantation its curious name, is visible from the roadway for the first time, perhaps, in a hundred years. And still the Canadian woodsmen go on, eating their way through the wood with a thoroughness that knows no mercy.

"The lumber camp is all Canadian—men, machinery, and methods. The men, who are drawn from all parts of the Dominion, have the bronzed, healthy look and the easy confident swing which we have learned to look for in Canadians. The khaki under their blue overalls proclaims them soldiers; they draw military pay and they know the rudiments of military drill; but first and last they are woodsmen, with their craft at their finger-tips. Every man knows his task and does it with an enviable independence of orders or instructions; yet from the first stage to the last the work proceeds smoothly and harmoniously. Let us follow the process, under the guidance of the officer in charge and the sergeant who is 'foreman of the bush.'

"Facing the main road stands the mill—'home,' the men generally call it—flanked on the one side by piles of logs and on the other by stacks of sawn timber. Walk along the winding track of a light railway, not yet completed, which passes behind the mill, until you come to a clearing, where burning heaps of 'brush' lopped from the tops of the fallen trees are filling the air with the refreshing scent of the pine. Here and there through the blue smoke you catch a glimpse of a lumberman in a picturesque slouch hat. A little further and you are among a gang of 'fallers.' Watch how they fell a tree, 70 inches or more thick at the base.

"A man with an axe kneels at its foot and with a few dexterous strokes cuts a deep notch in the trunk a few inches from the ground. Two others with a cross-cut saw cut through the stem on the opposite side. In half a minute the tree begins to lean and there is a warning shout. A second or two later, with a loud cracking and rending sound, it topples and

By Courtesy of Country Life of England.

STACKING THE SQUARED TIMBER

With sawmills in the forests where the timber is cut, the Canadians are turning out many carloads of lumber a day, most of which is shipped to the army in France.

crashes to the ground. Without any apparent effort, the 'fallers' have controlled the direction of its fall almost to a foot.

By Courtesy of Country Life of England.

CANADIAN STYLE OF FELLING TREES

There has arisen, since England started cutting her forests, a good-natured controversy as to which style of tree cutting is most effective—the Canadian, Portuguese or Irish.

"Next, without any ado, half a dozen 'swampers' set to work with the axe, clearing the limbs and straightening up the tree. Simultaneously a 'fitter,' with a wooden rod, divides the stem in suitable lengths, marking the cutting points with a notch; while two other men, one carrying a paint pot, measure the tree, enter the size in a book, and mark the stump and the butt of the severed trunk with a blob of red paint to show that their work is done. Sawyers then cut the stem according to the 'fitter's' marking, and the sections are ready to go to the mill. They are dragged there by horses over deeply scored 'trails' and 'sloopways,' and take their turn to come under the saw.

"The mill itself is a stoutly built structure, made of timber cut and prepared on the spot, the saws and engines coming from Canada. It is practically a raised platform covered by an iron roof, but open at the sides. A log to be sawn is rolled into position on a 'carriage,' which moves backwards and forwards to carry it through a circular saw. Two men, standing on the carriage, control its movements and the position of the log by a number of levers. Opposite them stands the most important man of all, the 'sawyer,' whose trained eye sees at a glance what can be made of this or that log. The hum of the engine and the screech of the saw would drown his voice, so he gives his decision by signs. As the carriage brings a log back through the saw with the bark removed, he will hold up one finger or two, and the 'setter' on the carriage, by movement of a lever, adjusts the log so that the next cut shall be one inch or two inches thick.

"It is all done without a pause. For hours the saw screeches and throws off a spray of sawdust as it slices up the logs that a short while before were splendid living trees, and all the while other saws, trimming the edges of the boards and cutting off the ends, join in the chorus. Is it surprising that the daughter of the keeper of the wood was reduced to tears when she stood by the mill?"

Of the uses of lumber in war, *Country Life of England* says:

"War has turned out to be a great consumer of lumber. Passing by for the moment the wooden huts and wooden carts for lodging and transport, the miscellaneous crowd of wooden boxes, cases and implements fashioned for equipment, how dependent on wood is the soldier when he takes the field! It did not take him long to learn that in a country like Flanders, with modern guns pointing at them, trenches must be deep to be of the slightest use, and that if they were deep would not stand wet weather unless propped with wood. Conjure up a vision of the wood being employed in the trenches, not of one army only, but of many, and it will be understood that the timber swallowing power of the coalpit as compared with that of the trench is as the swallow of the minnow compared to the swallow of the salmon. And yet the trench

By Courtesy of Country Life of England.

THE PORTUGUESE WAY OF CUTTING DOWN A TREE

The Portuguese contingent of timbermen in England was imported from Bragos, Maine. They are cheery, willing fellows and good workmen and have become prime favorites with the English.

represents only a feature of the total, especially in these days when military science orders that front line trenches should only be lightly held. Behind are the much more elaborate dug-outs. In the original trench the danger experienced was that of rain bringing on a landslip. The occupant in more than one instance was buried up to the shoulders in earth, and shot by the enemy before he could be extricated. In the early dug-out many lives were lost by shrapnel and splinters. From these they are now fortified by a roof built of heavy beams laid side by side. Let it be realised what a consumption of timber this means. Yet, practically speaking, there is no choice as to material. Steel is possible, but is in too much demand for actual fighting stuff. Cement has been tried, but will not do.

"On the road behind the lines there is an immense employment of heavy timber, without which the present advance, for example, would not have been possible. When the great guns used by the Germans at Verdun and by us to demolish their trenches between the Ancre and the Aisne have to be got forward, the only way to do it is by temporary railway lines. Hence the demand for sleepers. And every sleeper signalises that a large tree has been felled. Any intelligent student of the daily war news will be able to imagine without difficulty what a prodigious quantity of timber is being used up for this purpose alone. Nor can there be much need to enlarge on the other military demands for wood. It has been used freely not only in bridge building across rivers, but to make a bridge or passage over roads that in the fearfully wet weather would otherwise have been impassable to heavy military traffic. The Army is like a monster which has to be fed continuously on great shiploads of timber. The Home Grown Timber Committee is in this sense a great destructive agency, since it exists for the purpose of feeding this tremendous appetite as far as this can be done from home. Portugal, Spain and France have contributed a vast share. The demand is almost exclusively for soft wood, which is so much easier carried, manipulated, sawn, nailed and so on than hard wood."

By Courtesy of Country Life of England.

AN IRISH AXEMAN AT WORK

Country Life of England says: "The Irish are skilled men and have done good work They have a slight tendency to desire change, and every now and then a man or two 'slips it,' as their own foreman put it."

By Courtesy of Country Life of England.

ENGLISH WORKING WITH A CROSS-SAW

The English workman is more efficient with a cross-saw after a tree is felled than in felling the tree and most of them are used for this work.

THE bark of black oak, or "yellow oak," as it is often called on account of the color of the inner bark, is now used for dye-making.

A PORTUGUESE GANG FROM BRAGOS

Deserts Due to Deforestation

By Moye Wicks
Member of the Scientific Society, San Antonio, Texas

THE history of civilization has been a record of increasing deserts. Trees have disappeared before the advance of man like the buffalo. It is axiomatic with scientists that no country was originally a desert. All deserts have been man-made. The tree growth in Eastern and Central Asia and Northern Africa, the birth-places of the human family, soon fell before teeming populations. Those countries were already in process of becoming deserts before systematic agriculture was known in Europe.

When Zenobia was overthrown by the Romans under Aurelian, Palmyra, her capital, was the metropolis of a mighty empire. Now the shifting sands of Sahara almost hide the ruins of that stupendous city of marble and gold.

As late as the rise of Mohammedanism, in the seventh century of the Christian Era, the country of Tripoli, on the north African coast, had a population of 6,000,000 souls. It was then clothed with vineyards, orchards and forests. It is now bare of vegetation, the streams dried up and the population reduced to 45,000 people. The heat is so intense that the little labor done there is postponed until after the setting of the sun.

All this is due to reckless ravages upon tree growth. The hatred of a Turk for a tree is proverbial. Wherever the crescent of Mohammed achieved victory the Moslems destroyed the trees with nearly as much zeal as they have displayed in slaying those denying the inspiration of the "Camel Driver of Mecca."

Champollion, the famous Egyptologist, says of the Sahara desert of Northern Africa: "And so the astonishing fact dawns upon us that this desert was once a region of groves and fountains and the abode of happy millions. Does any crime against nature draw down a more dreadful curse than that of stripping Mother Earth of her sylvan covering? The hand of man has produced this desert, and, as I verily believe, every desert on the face of the earth."

In similar vein, Baron Alexander Von Humboldt says: "Man by his own recklessness brings upon himself a scarcity of wood and, resultingly, a lack of water." The famous Dr. Schleiman writes from Salonica: "As a fellow Unitarian, I feel sorry for the Turks, but as a respector of God's physical laws, I must own that they deserve their fate. Men who for twenty generations have shown themselves tree-destroyers on principle, have no right to complain if the world rises against them."

The student of natural science adopts these words of the distinguished explorer of the ruins of Troy, albeit

NO TREES TO BE FOUND HERE

This, at one time, well-forested section of Algeria, one hundred miles south of Algiers, is now a desert. Sudden rains fall and swell the mountain water-courses into temporary torrents, which almost as quickly subside. The herd of camels is being driven south after bringing up dates from the desert of Sahara.

with fear that, when weighed in the balance, our Caucasian race may prove, in this respect, equally remiss with the "turbaned and most malignant Turk."

Spain, Portugal, Southern Italy, Greece and many portions of both Americas, have suffered from the same reckless vandalism. Spain contains, in many of its provinces, only ten per cent of its former population, for even in the time of Vespasian it had, according to Pliny, in succession. The climate of that entire region has become 30 degrees warmer than what it was before its forests were destroyed. The climate of Southern and Central Europe is 20 degrees warmer than when in a condition of sylvan normality.

According to Xenophon, Greece, in his time, had winters of intense cold. He records in his "Memorabilia of Socrates" (for he was the Boswell of that ancient proto-

DENUDED MOUNTAINS IN ASIA MINOR

This view is of the village of Koplu, 130 kilometers southeast of Constantinople. The results of deforestation in the almost completely denuded mountains are seen. The areas of attempted reforestation are indicated by spots in which the shrubs are regularly spaced.

360 large cities. Greece now supports only 5 per cent of the population it had when it produced sculptors, poets, orators, philosophers, statesmen and soldiers, whom modern times have not surpassed. Indeed, all the coast that abuts upon the Mediterranean suffers more or less from the practices that consign the treeless country to aridity.

In ancient days, rain was so normally seasonable on all the Mediterranean shore lines that drought was considered a portent of the anger of the gods.

Northern Africa not only was self-supporting but was, in conjunction with Sicily and Sardinia, the granary of Rome; now Tunis, the site of the once great capital city of Carthage, is as nearly of furnace heat as the human family can endure.

De Baudin records the temperature in Eastern Algiers as 128 degrees in the shade for a great number of days

type of Dr. Samuel Johnson) that in the expedition against Corcyra, Socrates, to silence the complaints of his fellow-soldiers at their exposure, marched barefooted through the deep snows.

Cyrus, the same author relates in his "Anabasis," used to pass seven months of every year at Babylon, in the valley of Euphrates, to enjoy the perpetual spring there prevailing; now the heat is so oppressive in that treeless land as to make the people wholly inefficient and to render life well-nigh unbearable.

Horace in his ode "Ad Thaliarchum" speaks of the hail and snow on Mount Soracte, upon whose sun-baked sides no snow or hail has fallen for many centuries.

Asia Minor, for these same reasons, has become a parched and dying country. Spain and Portugal have lost productiveness as to 80 per cent of their former agricultural fields. The people are suffering from a

mental and psychological dry-rot, superinduced by the physical dessication of their lands.

We of the United States are traveling the same road, but traveling it with more rapidity. Our population is increasing and our means of feeding it decreasing. In two hundred years we have slain more trees than Europe slew in twenty centuries. The deadly work of deforestation is manifested in dry creeks and diminished rivers, where once those arteries of agricultural and commercial life were running bank-full.

When the rain comes now, it comes in torrents which rush off to the sea, laden with fertilization washed from the surface of the water-sheds. Such sudden downpours frequently flood the surrounding plains, with disastrous results to property and even to life.

Germany and France, according to a distinguished authority, suffered more damage by the floods of the single year 1883, than by all the expense and losses caused by the Franco-Prussian war.

Fifty years ago, De Bonville, Prefect of the Lower Alps, addressed to the government a report in which he describes the appearance of the upper mountain valleys after the loss of their forests, from which report the following excerpt is taken:

"There is no doubt that the vegetable mold of the Alps swept off by the increase of that curse of the mountains, the torrents, is daily diminishing with frightful rapidity. All our Alps are wholly, or in large proportion, bared of wood. Their soil, scorched by the sun of Providence, cut up by the hoofs of the sheep, which, not finding on the surface the grass they require for their sustenance, scratch the ground in search of roots to satisfy their hunger, . . . is periodically washed away and carried off by melting snows and rain-storms."

In our own country the overflows of the Mississippi River alone have caused more loss of property than all the wars in which our government has ever been engaged, and these overflows directly result from ill-regulated torrential rains arising from abnormal conditions caused by deforestation of its enormous water-shed.

Many portions of Europe, occupied by industrious nations for more than a thousand years, are better supplied with forest trees than some of our own states. There are localities in North America which, a generation ago, were a part of the great American forest, yet now, since becoming denuded of tree growth, have fallen into that condition of chronic lack of rains which makes good crops the exception and not the rule, and which is the precursor of an ultimately desert condition.

Even as the stripling, coming by inheritance into a large estate, loses sight of the value of his possessions in the ease of their acquisition, so we Americans have prodigally wasted the superabundant advantages afforded by the resources of the new world. Every intelligent man of mature years will recall instances, within his own observation, of diminution of rain-fall going hand in hand with diminution of tree growth in the same locality—a steady decrease in regularity and amount of rain-fall being perceptible wherever the forests have been devastated by man.

DESOLATION IN ALGERIA

Representative of the Smithsonian (Washington, D. C.), astronomical expedition of 1912 near Bassour, Algeria. This station is on a rolling plateau region about fifty miles south of Algiers. Heavy snowfalls occur in winter and occasional small rains in all months. Except for a few scrub oaks the region is now treeless and vegetation is completely dried up—once this region was well wooded and prosperous.

Utah illustrates the same scientific truth, but conversely, for the Mormons, who found the country treeless, have nearly doubled their annual rainfall, and have largely increased the size of their lakes and streams by planting orchards and by reforestation. In much the same way Nebraska has been made productive within the last thirty years.

Near the close of the last century the great lake in the Valley of Aragua, in Venezuela, was found to be rapidly lessening in area as the clearing increased, so that it was about to become dry. A civil war breaking out at that time, with the virulence for which South America political affairs are noted, the forest was allowed to spring up again through neglect of agriculture, and, in a quarter of a century, the lake and its tributary streams resumed their original dimensions.

Dr. Rogers, of Mauritius, gives this testimony: "So late as 1865 this island was resorted to by invalids from

India and elsewhere as the Pearl of the Indian Ocean—it being one mass of verdure—but when the forests were cleared to make space for sugar cultivation, the rainfall diminished; the rivers dwindled to muddy streams; the water became stagnant in creeks, crevices and natural hollows; the equable temperature of the island entirely changed; drought was experienced and showers rarely came. The hills were subsequently planted with trees and the rivers and streams finally resumed their former dimensions."

George P. Marsh, in *Man and Nature,* says: "A territory larger than all Europe, the abundance of which in bygone centuries sustained a population scarcely inferior to that of the present Christian world, has been entirely withdrawn from human use, or at best inhabited by tribes too few and poor to contribute anything to the moral and material interests of mankind. The destructive changes occasioned by the agency of man upon the flanks of the Alps, and Apennines, the Pyrenees and other mountain ranges of Central and Southern Europe, and the progress of physical deterioration, have become so rapid that in some localities, a single generation has witnessed the beginning and the end of the melancholy revolution."

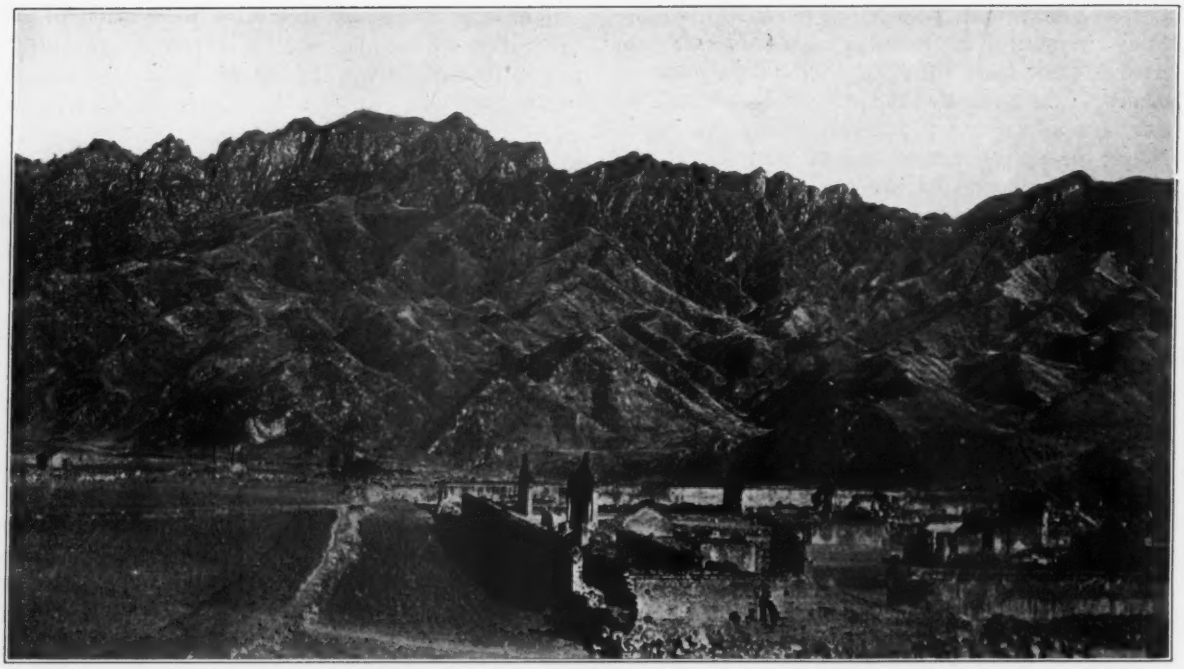
The distinguished Sir John Herschel, speaking of the destruction of forests, says: "This is no doubt the reason of the extreme aridity of Spain. In France much injury has been done in like manner by tree destruction. Rain has been much increased in Egypt by vigorous planting of trees."

The country where Carthage once controlled her great republic, containing 300 cities, is now the scorched abode of indolent Tunisians. Gibbon declares "that 500 cities once flourished in what are now the dry depopulated plains of Asia Minor."

Palestine, now but a memory and a shrine, was at one time the most productive section of the ancient world, crowded with cities and villages, and of such political prominence, at even the late day of her conquest by Rome, that the Senate decreed a special triumphal arch to be erected to the victorious Roman general in commemoration of the downfall of Jerusalem, and ordered medals struck with the exulting inscription "Judea Capta." These medals have been found in the mud of the Tiber and in Roman excavations, and the triumphal arch to Titus still stands in the Appian Way—all bear-

RICH BOTTOMLANDS DESTROYED

Once this valley near Wu-tai-shan in Shan-si Province, China, was fertile, had rich farms and sustained a large population. The people stripped the mountains of their trees, failed to provide for reforestation and in time the mountains became what they are now, bare mounds of earth and rock. Rainfall and erosion did the rest. Rock and earth slides from the mountains swept into the valley, covered the rich soil, destroyed the farms and turned the region into a rocky desert.



ABANDONED FOU-PING, CHI-LI PROVINCE, CHINA

This once prosperous city has been abandoned because the once well-forested hills in the vicinity have been stripped bare of trees, the springs have dried up, and there is nothing by which to sustain the inhabitants of the city. This city was built and the plain cultivated in 1725 and since that time the hills have been cleared and the district ruined.

ing testimony of how important Palestine was deemed by the Mistress of the World before the tree-destroying Turk made it a sterile waste.

The island of Santa Cruz, off the coast of California, once supported an extensive Indian population; now that it has been stripped of its forests it has no water, and gives no return to the husbandman.

In Europe attention has been turned of recent years to this subject more than would be supposed by one who has not given such matters investigation. In every country in the Old World, save the British Islands, there are schools of forestry, and such schools are notably numerous in Germany.

In thickly-settled France, so many lives were lost and so much property destroyed by the torrential rains incident to forest destruction that a law was enacted, and is now in force, throughout that Republic, providing that, if a field become bare of trees, and is, in the opinion of the local authorities, better suited for arboriculture than agriculture, governmental aid will be given to the owner by furnishing him trees at a nominal price. If the owner fails to plant the trees, or, having planted them, fails to care for them, the local superintendent of tree culture may take possession and maintain the trees at the cost of the French Republic. Within five years the owner may, by paying to the government the principal and interest of the outlay, redeem his field; or, by deeding one-half to the government within that time, may redeem the other half, but if he does neither, the entire field becomes governmental domain at the expiration of that statutory period. These provisions of law may seem like "locking the stable after the horse is stolen," but sometimes, by locking the door even then, we may save the balance of the livestock.

It is certain that the arid lands we have in North America have been made so by the extermination of the trees through forest fires and, possibly, the destruction of trees for fuel and clearing for cultivation by the great pre-historic agricultural people who preceded the nomadic Indians. The springing up again of these destroyed forests may have been prevented by the resulting drought, or by the young trees being killed by the frequent prairie fires kindled by man or arising from spontaneous combustion; or by the young trees being eaten or trampled down, while yet small, by the buffalo and other herbivorous quadrupeds which abounded in earlier times. The Indians frequently made fires to kill the tree growth to make better grazing for buffalo and deer, and to thereby make their immediate localities more attractive resorts for wild game. The stockman frequently does the same now to improve the pasturage for his cattle and horses.

It is a legend of the Kiowas, at San Gorgonio, California, that many centuries ago the Indians prayed the Great Spirit for a ruler, and He sent them a king who was white, blue-eyed and bearded. The legend continues that this king governed them so successfully as to convert all the lands into a garden and that orchards and vineyards, watered by running streams, covered all of what is now the Colorado desert. According to the story, as told by Kiowa Indians, the people became so proud that they ceased to worship the Great Spirit and made an idol of their king, and to punish them their god dried up the stream, destroyed the orchards and vineyards and made the Colorado desert.

This tradition was related to the writer many years ago by Manuel Largo, the chief of the Kiowa tribe. It is interesting in two ways. It seems to point to a successful civilization under the rule of some fair-skinned stranger—perhaps some shipwrecked blonde and bearded Phœnician of remote antiquity, and it seems also to substantiate the theory, here advanced, that originally there were no deserts. All students of myths and folklore admit that every deep-rooted racial legend has some origin, however slight, in actual fact, and it may well be that this tradition is a record, naturally intermixed with blunder, of a time when bounteous Nature smiled on industrious man, and when all the great Colorado desert actually afforded support to a soil-tilling population. In fact, a marvelously productive section of country has been rescued from the Colorado desert of recent years and now is known in the Imperial Valley of Southern California.

DEFORESTATION—THEN DEVASTATION

This view shows two hundred square miles of the once well-wooded mountains in the vicinity of Fou-ping, China. This district a century ago paid rich revenue from its forest products. Today it is practically a desert.

In the incalculable antiquity of man's pre-Adamite occupancy of this planet, the comedy and tragedy of life may have been played by teeming millions in arid America thousands of years before our half-naked ancestors hurled their rude spears at Cæsar's cohorts disembarking upon the shores of England. The earth is the grave of the past as well as the tomb of the future.

Trees are inducers of rain, and, in a special degree are conservators and gradual distributors of the moisture that falls. As things to which we are most accustomed are sometimes the least known to us in an accurate way, it may not be amiss to propound and answer an apparently simple question:

What is a tree and what is a leaf and what are their functions?

In reply, it may be said that a tree is a great botanical structure intended as a conductor of moisture from earth to air; an attracter of moisture from air to earth; a moderator of heat in summer and of cold in winter; and, by reason of its shade, its obstruction to winds, its root system and its sap, an economizing storage and conservator of the actual rainfall.

The leaves are the lungs of the tree. In the economy of arboreal nature they are the equalizers and moderators of temperature and moisture. When the air is moist they absorb the dampness and thriftily store it away in capacious reservoirs of millions of tubes in the trunks and limbs of the trees; and, when parched Nature looks upward and prays for water, like Dives did to Abraham and Lazarus, these same little " miracles of design " draw on the supply of water in the tree that they have stored away and that the rootlets have absorbed from the earth and send the precious liquid forth into the air, an unseen exhalation to be condensed by the atmosphere and to fall in benedictory showers or refreshing dew.

This same water, but for the tree and its foliage, would be carried away by vagrant winds, or, if it fell, would fall in sudden gusty showers and be lost to use.

It is known to botanists that each square inch of leaf-structure lifts and throws out into the air in dry weather 6/1000 of an ounce of water every twenty-four hours. A large forest tree has foliage equal to above 5 acres of superficial area, or 6,272,600 square inches. This

TRYING TO SAVE WHAT IS LEFT OF THE SOIL

Having no tree growth, no undergrowth, and no natural growth of any kind, these hills in China have to be subjected to the kind of artificial terracing shown in this photograph in the effort to save what little of the soil there is left.

multiplied by 6/1000, the amount radiated out by every square inch, gives us a number of ounces equaling 294 gallons, or more than eight barrels of moisture thrown out into the dry air each twenty-four hours by each large forest tree. Other trees that need more water will, if growing nearby, absorb it from these generous neighbors, as for example, the magnolia will flourish at Los Angeles, California, if near other trees, but will die if it be planted alone.

In another and preëminently important way, the leaf is constantly at work for man. Its serrated edges are tiny tentacles to catch the electricity and send it down to work vivifying effects upon the earth. The soil is energized by this constant electrical stimulation. It is proper to use the adjective "constant" for the process goes on all the time. Electricity is more constantly tingling through the fibres of a growing tree than it is through a telegraph wire. It is a mistake to suppose that the electrical current never touches the tree save when it is said to be "struck by lightning." This bursting open of the tree by lightning is only when the attraction of the tree brings to it, in highly charged electrical conditions of atmosphere, more electricity than the trunk of the tree can, at one time, normally transmit from the leaves to the earth.

It is not merely because they attract precipitation of rain that trees are valuable to climate and to productiveness. In the forest soil that they cover and make solid by their root systems and enrich and mulch with their decaying leaves, the rain finds storage for much more than can be absorbed by tree roots.

This stored water, by slow percolation, trickles (without washing or injury to the soil) from its spongy reservoirs among the roots, leaves, moist and cool depressions in the forest glades, and feeds the springs and water courses when nature is athirst. In the same way do trees preserve the snow from sudden melting and hold it in reserve for human needs.

On the other hand, the treeless country receives its diminished rain torrentially, accompanied by violent squalls of wind—the decomposed vegetable matter and the surface soil, that has been disintegrated into mellowness by sun and air, are washed from the surface of the hills and sloping plains and carried away into the sandy river beds (along with the torrents of escaping water) to be lost in the sea or to enrich some delta country far down the stream. In such countries it frequently happens that great raging floods pour down river beds—ordinarily dry-rivers, as one might say, invisible in the dry season and invincible in the wet season.

ARTIFICIAL TERRACING IN CHINA

Showing the efforts of the Chinese to save what is left of the soil after the forests are gone.

The water, so falling and so escaping, is a robber and not a friend. The merest surface is made wet by it and such moisture as it does leave is almost immediately evaporated by the winds that in treeless countries usually follow the atmospheric disturbances incident to rain. The torrential flow, thus carrying off the vital element for which all nature is suffering, seems to the thoughtful mind as the life-blood flowing from a severed human artery must seem to a surgeon.

The authorities on such subjects state that one acre of beech trees will absorb and subsequently throw out by slow degrees, as the dryness of the air may call for it, as much moisture as 200 acres of grain.

Such exhaled humidity not only mitigates the heat of summer, but modifies the cold of winter, this latter being on the principle that prompts the florist to place barrels of water in his conservatory to assist in protecting his flowers from freezing in seasons of cold.

THIS IS IN OUR OWN COUNTRY

"Hog backs" in Salt Creek foothills in the neighborhood of the Roosevelt Reclaim Project, Gila County, Arizona, showing the results of deforestation.

In Sweden, there is a saying that the forest is the peasant's fire. In our own country all must have observed, after traveling over a plain in winter, that if one enters a forest the temperature is much more moderate, apart from the protection from the winds which the forest affords as a mechanical barrier to their violence. This greater warmth engendered by tree planting spurs the adjoining vegetable growth, while the maturity of fruits and grain is not so much checked by cold at night and at other times.

Besides this actual mitigation of the temperature, trees, by checking the force of the winds in this way, also conserve the water in the soil by minimizing evaporation. All know how much more quickly an article will dry in even cold wind than it will hanging quietly in the warmest sunlight. Wet roads will dry much more speedily from wind than from sun action.

After the rain has fallen, water stands visibly around the grass roots in the pasture long after the bare road is free from moisture.

The air at rest is soon saturated with moisture and takes up no more until that with which it is laden is absorbed, but the unchecked wind, careering over the treeless plain, greedily gathers all moisture and carries it away to precipitate it in sudden torrential showers, on, perhaps, the hot sides of a bleak mountain range hundreds of miles away.

The Colorado and Mohave deserts are not normally such—they are vast plains which would be fertile if they had not been robbed of their normal trees and thereby lost power of spontaneous productiveness.

Forests exhale oxygen, the absolute essential for human well-being, and absorb and neutralize the noxious effects of carbonic and other injurious gases. The fever prevalent in the Roman Campagna was so severe that the approach through it to Rome was, until recent years, an object of terror to Italians and foreigners alike. The monasteries there were abandoned and even to cross it was deemed suicidal; but now hundreds of thousands of eucalyptus trees having been planted there and having grown up, it is densely populated by farmers and vineyardists.

One of the secondary, but important, results of the present suicidal European war will be the wholesale destruction of the tree growth in the belligerent countries and the attendant train of ill which follows deforestation.

Some fifty years ago, Commodore Matthew Fontaine Maury (well known as the Christopher Columbus of the Gulf Stream) found the national observatory at Washington unwholesome, those living there suffering continually from fever and ague. To remedy this condition he planted large fields of sunflowers, and, though the Potomac malaria made the fever and ague extensively prevalent in the city generally, none of those living at the observatory, or in the vicinity of the sunflowers, were so attacked.

Dear Mother Nature responds generously to the efforts of her children to repair the mistakes of the past.

It may be remarked, parenthetically, that trees are the homes of birds, and, to say nothing of the æsthetic charm of their beauty and song, birds free the fields from insects and from bugs to such an extent that they deserve to rank high in the list of the farmer's friends. It is probable that if Texas had normal tree growth clothing prairies and

valleys, the birds would be numerous enough to have prevented the boll weevil and all other insect pests.

It is likely that the electrical functions of trees constitute their source of power to directly cause rainfall, but whatever the explanation, there can be no doubt of the potency of forests to attract precipitation. To name one of many illustrations of this, the annual rainfall of Egypt has been doubled by the Khedive's extensive planting of date palms, olive orchards and eucalyptus groves.

Aside from the general benefits to be derived from tree culture, there should be a special planting of willows, osiers and other flexible woods of the water-loving varieties, along the sides of the irrigating ditches. These will make stronger the ditch embankments against breaks and by their shade save water from evaporation. In addition to this consideration, it is worthy of mention that such growths can be utilized in various industries. Indeed, many manufacturing possibilities are denied treeless countries, to say nothing of the advantage forests afford for purposes of fuel.

Skilled industry can find work and riches in utilizing the materials afforded by varied wood crops—not merely acquiring, but creating wealth, for he who adds to the value of the products of the soil enlarges the wealth of his country in the truest sense.

The American mind is quick to receive and tenacious to retain a suggestion so fraught with interest. In this new land we do not fear innovation, but readily throw off the handicap of inexperience and inadvertence. Action should be taken to bring to public notice the truth about the important part trees play in all their bearings upon climate, floods, cyclones, droughts, blizzards, commerce, manufactures, agriculture and health. Laws should be passed in the various states giving at public expense to each reputable person such young trees as he will obligate himself to plant and maintain, and lands so planted in forestry form should be exempted from taxation for a liberal period of years.

State boards of forestry should be created to study the protection and encouragement of tree growth. All school children of suitable age should be required to plant trees on Arbor Day, and instruction as to the public school curriculum. All country roads and highways should be planted with rows of trees cared for by road overseers at public expense. Congress should set apart as permanent governmental reservations those large tracts of timbered mountain lands which we so urgently need in the interest of our streams and springs, and which otherwise will sooner or later be despoiled by the ruthless axemen, or by careless hunters or reckless stockmen. Every one should encourage the planting and protection of trees whenever and wherever possible.

An old writer asserts "the skin of the animal is not more necessary to its well-being than is the tree covering of the earth essential to the proper condition of the soil." In our own day Dr. Oliver Wendell Holmes declares, "When we plant a tree we are doing what we can to make our planet a more wholesome and happier dwelling place for those who come after us as well as for ourselves."

"Jock," said the dying Laird of Dumbeidykes to his son, in one of Sir Walter Scott's charming novels, "Jock, when ye hae naething else to do, ye maun e'en be sticking in a tree; it will be growing while ye are sleeping."

CHICAGO'S MUNICIPAL FOREST

The city of Chicago, or rather Cook County, which is practically the same territory, has begun to look forward to the day when it will have a municipal forest. An appropriation of about $1,000,000 has been provided for the gradual establishment of such a forest. There has been a commission named to take up this problem, after thorough investigation. The details are far from worked out, but the theory of the municipal forest is what is of greater importance to the future of the conservation movement than the mere local details. The fact that Cook County is preparing to establish such a forest, something on the lines of the German forests, is a hint that the nation is coming to its senses on the problem of the future of the trees. The Cook County forest is probably to be called the county forest preserve.

But it is not only the big cities that are considering this problem. The city of Janesville, Wisconsin, a town of under 30,000, has decided to plant beechnut trees in the neighborhood of the city, and while at first the plan is only to beautify the highways radiating from the city into a thickly populated, immensely rich farming country, the plan has the future thought of solid forests of beech, duplicating the Danish forests. The county highway commission is back of the movement, Commissioner George S. Parker having received a consignment of beechnuts at considerable expense, from the royal Danish forest, and has opened a contest in tree growing for the boys of the county.

A SHAKESPEARE OAK

On the grounds of the Panama-California International Exposition in San Diego, California, on Shakespeare Day, the anniversary was celebrated by a pageant and by the planting of a live oak tree in memory of the great literary light. Little Miss Mary Church, who was in Stratford-on-Avon when the present European war commenced, had the honor of turning the turf for the tree planting.

The Bird Department

By A. A. Allen, Ph.D.

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FEDERAL PROTECTION OF BIRDS

A GREAT many years have now passed since the people of the United States first came to the realization that birds and game cannot stand unlimited slaughter and that they are worthy of protection by law. It was as early as 1791 that an act was passed in the New York Legislature giving some protection to the heath hen, the partridge, the quail and the woodcock. This was a step in the right direction, but it did not come soon enough to save the heath hen, for to-day this splendid bird is extinct except for a small colony carefully guarded on the island of Martha's Vineyard. The partridge, quail and woodcock have survived, but in greatly reduced numbers.

Nearly thirty years elapsed after the passage of this initial statute before anything further was done for bird or game conservation. Massachusetts next, in 1818, passed a law giving protection during the breeding season to certain game and insectivorous birds. This was the first time that such birds as the lark and the robin were recognized as having any economic value, but it was not until after the middle of the century that the cause was espoused by many states. Between 1850 and 1864 laws were passed in twelve states giving more or less protection to insectivorous birds as well as to game.

WATERFOWL RESPOND VERY QUICKLY TO PROTECTION
Some wild bluebills that have been tamed by feeding at Ithaca, New York.

It will be of interest to quote the first of these, enacted by the State of New Jersey in 1850, because it is indicative of the inaccuracies and incompleteness retained in so many state laws even to-day. It was entitled, "An act to Prevent the Destruction of Small and Harmless Birds."

"1. *Be it enacted by the Senate and General Assembly of the State of New Jersey,* That it shall not be lawful in this State for any person to shoot, or in any other manner to kill or destroy, except upon his own premises, any of the following description of birds: The night or mosquito hawk, chimney swallow, barn swallow, martin or swift, whippowil, cuckoo, kingbird or bee martin, woodpecker, claip or high hole, catbird, wren, bluebird, meadow lark, brown thrusher, dove, firebird or summer redbird, hanging bird, ground robin or chewink, bobolink or ricebird, robin, snow or chipping bird, sparrow, Carolina lit, warbler, bat, blackbird, blue jay, and the small owl."

Photograph by Francis Harper.

THE RESULT OF STOPPING SPRING SHOOTING

A small part of a flock of black ducks flying over Long Island. Since they are not shot at, many stop to nest instead of going further north, and as a result their numbers increase rapidly.

Since this period, when the Nation was first awakening to the need of legislation in behalf of game, great progress has been made, so that to-day every state has its code of game laws, although in some, where there is no warden system, they are but slightly respected and might almost as well be void. Many states, however, have model laws, uniform with those of adjacent states, leaving little to be desired from the standpoint of conservation. These laws define what shall be known as game birds and limit the season during which they may be killed, and all other birds, except a few that are known

to be injurious, they protect at all seasons of the year. Certain game birds, too, that are becoming very scarce are given absolute protection for a term of years and, furthermore, all traffic in feathers is stopped. In backward states, however, many birds known to be insectivorous are still classed as game, and open seasons on all game are designated regardless of the laws of neighboring states.

Spring shooting, for example, is acknowledged by

CANVAS-BACKS ARE COMING BACK

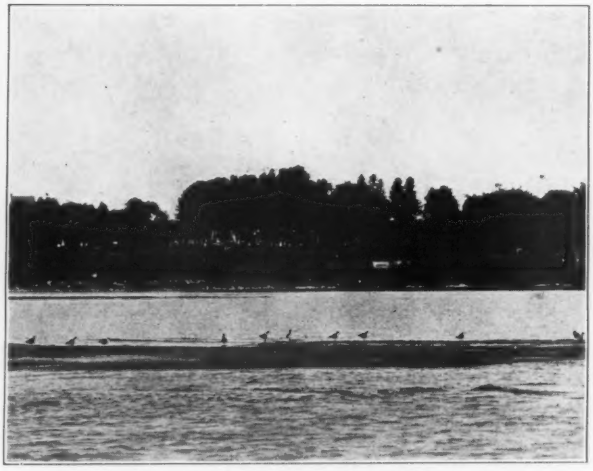
Since the stopping of spring shooting these ducks, beloved by epicures, are now reappearing on the Chesapeake and are increasing everywhere. There are a few bluebills among the canvas-backs in the photograph.

every thinking person to have been the chief factor in the very rapid decrease of waterfowl and shorebirds. Ducks mate early in the year, during February or early March at the latest, and when one of a pair is killed the other does not remate and no brood is forthcoming the following season. At best but two birds are secured in the spring instead of five or ten in the fall. To say the least, it is very poor economy and when added to it, the birds are disturbed on their nesting grounds during April, and perhaps do not breed at all, no thinking person should indulge in spring shooting.

With the abolishing of spring shooting in most states, there immediately occurred a great increase in all species of ducks; likewise shorebirds and some, notably the wood duck, woodcock, curlews and upland plover, were actually saved from extermination. Ponds that had not seen ducks for years again teemed with them, and hunting grounds that had been abandoned again gave good sport. In spite of this manifest improvement, however, we find, as late as 1915, some state laws still permitting the shooting of waterfowl until the middle of April, and when a revision of the Federal Statutes was called for, these states were insistent upon this privilege. One of the greatest difficulties that conservation workers have met in trying to establish model game laws has been the jealousy aroused by the laws permitting spring shooting in neighboring states. As long as any state permits spring shooting, the adjacent states will not be satisfied without it, because of the fact that waterfowl are migratory and the very birds that they are protecting on Monday may be shot on Tuesday if they fly across the border.

If all game and insectivorous birds were permanent residents, like the grouse and the quail, state laws would be sufficient, because no one would suffer except the makers of the laws, and if the people of a state wished to exterminate their song and game birds, they would be despoiling only themselves. But when we know that the majority of birds are migratory and can be said to belong to no state in particular, an entirely different problem presents itself. It becomes necessary for the Federal Government to step in.

To be more concrete, the people of North Dakota might claim that the mallard ducks belong to them because they breed about their lakes and consume the wild rice of their marshes. The people of Louisiana, however, with equal justice could claim the same birds, be-



THE BLACK-BELLIED PLOVER

These birds were threatened with extermination but are now increasing. A flock of a dozen on a bar at the north end of Cayuga Lake, New York. A few years ago it was exceptional to see more than two or three together.

cause from October until February they are consuming the duck potatoes of their lagoons. The citizens of the intervening states have some claim, likewise, because for a month or two in the fall and spring, while the mallards are passing between their breeding and wintering grounds, they stop in their ponds and feed upon their property. Now if the people of North Dakota should see fit to reap the harvest of their ducks in summer and thereby exterminate them, they would at the same time be exterminating the ducks of Louisiana, Arkansas, Missouri, Kansas and Nebraska.

In a similar way, the people from New Jersey to South Carolina can declare the " ricebirds " feeding about their marshes to be injurious and slaughter them by thousands. But for every " ricebird " that is killed the people of New York and New England lose one bobolink from their clover fields.

Realizing this, conservationists have gradually come to the conclusion that the game of a country belongs to the people as a whole rather than to the individual states, as was formerly believed, at least in so far as migratory species are concerned, and for the last twelve years they have been trying to bring this realization to the country at large. Ever since 1904 bills have been brought into

Congress aiming at Federal control of migratory birds, but it was not until 1913 that any one of them bore fruit. The first bills that were brought up failed because they had little support, but during the nine years that ensued, the public became aroused to the importance of bird life and the necessity for conserving the game resources. There was little doubt as to how Congress should act, but great opposition was brought forward by agents for milliners, market hunters, and the congressmen of backward states that were still enjoying spring shooting. Thus, after a long struggle, the Weeks-McLean Bill, as it is known, passed both houses and was signed by the President March 4, 1913.

According to its provisions "All wild geese, wild swans, brant, wild ducks, snipe, plover, woodcock, rail, wild pigeons and all other migratory game and insectivorous birds which in their migrations pass through or do not remain permanently the entire year within the borders of any state or territory, shall hereafter be deemed to be within the custody and protection of the Government of the United States, and shall not be destroyed or taken contrary to regulations hereinafter provided therefor."

The Department of Agriculture was authorized to draw up the regulations and submit them to the people for three months' consideration before final adoption. The task naturally devolved upon the Division of the Biological Survey whose corps of scientists have before them all the known facts concerning the migrations of birds, their lines of flight, their breeding habits, reproductive capacity and other necessary data. Could they be left free to formulate the regulations in accordance with their scientific investigations and conclusions, a very nearly perfect law would result. Their power is limited, however, and committees are human and listen to the demands of outraged congressmen whose constituents have had some of their "vested rights" removed and minor faults have crept into the regulations, such for example, as permitting in some states the shooting of bobolinks. But the regulations, as a whole, are so far superior to the majority of individual state laws that all true conservationists rejoice in their enactment.

By this McLean Law, the country is divided into two zones: the breeding zone and the wintering zone, and an open season is established for each, making such exceptions in different states as have been found necessary by variations in flight lines, times of migration, etc., effort being made to give each district an equal amount of shooting during the period when the birds can best stand it. Insectivorous birds are protected throughout the year, the smaller species of shorebirds are removed from the game list and certain species that are nearing extinction are given absolute protection for a term of years. No provision is made, however, for federal protection of such birds as the gulls and terns, grebes, herons and egrets which are so much in need of it, or for the little song sparrows, buntings, goldfinches, and horned larks whose food is largely the seeds of weeds rather than insects. There is still something to be done.

The McLean Law went into effect in October, 1914, continuing in force through 1915 and, with slight revision, is being enforced in 1916. Effort has been made, however, to destroy the effect of the law by cutting out any appropriation to enforce it, but the friends of the Bill have managed to secure $50,000 each year, a rather meager amount when one stops to consider the vast area of the United States and Alaska, for it allows of but one paid inspector for several states.

But the grave danger which presents itself is not so much the lack of appropriation, severe as that is, as in the fact that the constitutionality of the law itself has been questioned. One of the earliest cases that came up was that before a District Judge, in Arkansas, of a man who had killed some birds in violation of the McLean Law. In handing down his decision, Judge Trieber declared that there was no provision in the Constitution of the United States upon which the McLean Law could be based and it was, therefore, unconstitutional and could not be enforced. The case was taken to the Supreme Court where it now rests and from which a decision is expected some time this fall. In the meantime, the law has been enforced elsewhere and declared constitutional by other District Judges, and, strengthening it still further, a treaty with Canada along the same lines has been ratified by both Houses, signed by the President and awaits only the signature of King George. When the treaty goes into force and the McLean Law is either declared constitutional or an amendment made to the Constitution by which it may stand, there will remain only the matter of sufficient appropriation in order to put the United States in lead of the world in matters of bird and game conservation and guarantee to future generations the blessings which our forefathers enjoyed and the resources which have heretofore been so ravished.

In reviewing the history of what is perhaps the greatest stride that conservation has ever taken, one cannot but admire the altruistic labors of those who have devoted their time, their energy and their funds to the great undertaking. The National Association of Audubon Societies, The American Game Protective and Propagation Association, The Campfire Club of America, The New York Zoological Society, The Boone and Crockett Club, The National Federation of Women's Clubs, The Long Island Sportsmen's Association, and numerous other organizations and thousands of individuals all over the country, have worked untiringly, not only upon the Bill but upon educating the country at large so that it would react through Congress and bring about the result that has been so happily achieved. The eyes of the nation now turn toward the Supreme Court awaiting the decision that will announce whether the victory has been won or whether it will be necessary to postpone the enforcement of the law until a constitutional amendment can be made. But in the larger sense the victory has been won, regardless of the decision, because the country is awake. It knows the value of birds and the necessity for conservation. Laws mean nothing until they are obeyed, and an enlightened public sentiment is worth more than all the officers of the law.

The Crows and Jays

(Family Corvidæ)

SOMETIMES given first rank among birds because of their intelligence, the crows and jays, together with the ravens, magpies, and the European jackdaws, rooks and choughs, constitute a family of birds familiar to everyone. There are about two hundred species found all over the world, except New Zealand, twenty-one of which occur in North America. All of them make interesting but mischievous pets and many

CROWS IN WINTER AT A WATER-HOLE

After the nesting season, crows gather in immense flocks, and frequently tens of thousands are to be seen on a single roost. They are ever alert and difficult of approach.

can be taught to articulate a few words, but in their natural state they are hated by agriculturists and feared by other birds.

All members of the family have stout, heavy bills with thick tufts of bristles at the base concealing the nostrils, strong legs and toes, adapted for walking and perching, and strong rounded wings. Our American crows and ravens are uniformly black with metallic reflections, but the jays and magpies are brilliantly colored, blues, greens, blacks and whites predominating. Crows and ravens are further characterized by short square tails while the jays and magpies have long graduated tails.

All species are omnivorous feeders, taking nuts, fruit, and grain, together with insects, crayfish, fish and the eggs and young of other birds. Whatever is most easily secured always suits the taste of the crows and jays, and for this reason they are often of considerable value during insect outbreaks, because the insects are then most easily secured and are fed upon to the exclusion of everything else. On the other hand, where eggs or grain are more easily secured than insects, they may do considerable damage.

The jays are mostly woodland birds and the damage which they do is largely confined to the eggs and young of smaller birds. They are important factors in the natural dispersal of nut, oak and fruit trees and, like the crows, are undoubtedly responsible for the wide distribution and constant recurrence of poison ivy. The blue jay is the commonest species throughout eastern North America, the Canada jay or "camp robber" throughout the North Country, the Steller's jay throughout the West and the California jay in the Pacific Coast region. They are noisy birds, travelling in small companies except during the nesting season and delighting in mobbing a waiting hawk or a sleepy owl. At times they are good mimics and frequently bring consternation into the ranks of smaller birds by suddenly bursting in on them with the call of a dangerous hawk. Jays nest early in the spring,

USELESS? NO, WORTH SAVING?

The common crow of the United States is a mischievous bird, but wary enough to save his life even in thickly settled parts. He does considerable damage and much good and, on the whole, is not deserving of extermination.

building rather bulky nests of sticks lined with rootlets and laying grayish or greenish spotted eggs.

Crows are much more destructive than the jays because they combine with the thieving, egg-destroying habits of the jays, greater size and bolder habits. Thus they often come into the poultry-yard like hawks after young chickens and regularly feed about corn and grain fields. The damage that they do in the grain fields, however, is largely paid for by the numbers of harmful insects which they destroy. Many times it has been shown when they have been thought to be pulling the young corn, that they have been merely after the wire worms working about the roots. In the meadows they destroy large numbers of white grubs and grasshoppers, and fields near woods frequented by them have been cleared of army worms, while adjacent fields have been

entirely denuded by the worms. On the whole, however, crows are scarcely deserving of protection, yet certainly bounties should not be offered for them, nor should any attempt be made to exterminate them. On the other hand, they are such wary birds that they are well able to care for themselves and in no danger of extinction even in the most settled country. Because of their wariness they are usually easily frightened from corn fields by the ordinary scarecrow or strings stretched across the fields, provided these are moved about every few days so that the birds will not become accustomed to them. In extreme cases a gun fired occasionally in the general direction of the crows will suffice to keep them afraid of the scarecrows.

Photograph by Francis Harper.

A BLUE-JAY ON ITS NEST

Jays are noisy birds of quarrelsome dispositions and thieving habits, often robbing the nests of smaller birds.

The fish crow, which is a smaller species found along the Atlantic Coast region, is even more destructive to small birds than its larger relative. It is less wary, often flying through city streets or walking about park lawns and its high nasal *cah-cah* sounds like the voice of a young common crow before it has left the nest. The raven which, with but little variation in size, is found throughout the Northern Hemisphere, is more a bird of the forests and wilder places and with the clearing of the forests in eastern North America has been entirely replaced by the crow.

THE Lincoln Highway between Salt Lake City and San Francisco, California, will be marked with redwood posts. There will be one post to each mile, the distance between these two points being 1,000 miles. These posts will carry the usual sign indicating that it is the Lincoln Highway. They will be set rough and will require no painting to protect them from the weather. The Lincoln Highway Commissioners had under consideration the use of boiler tubes and redwood was selected in preference.

THE WHITE-THROATED SPARROW

PAULINA BRANDRETH

NOT Orpheus fluting in his greenwood cell,
Nor shy Narcissus answering the call
Of lone, lost Echo in her mountain thrall,
Can such a tale of tender sadness tell
As thou, O sylvan whistler, who dost dwell
Midst forest deeps where balsam shadows fall.

Ere yet the sun ascends o'er swamp and glade,
Thy solitary notes, full-rounded, clear,
Float skyward from the secret haunts of deer.
In thee the Wilderness her heart hath laid,
To thee the pathos of her soul hath strayed
Like beauty cloistered in a human tear.

AN APPALACHIAN PURCHASE

THE National Forest Reservation Commission has approved the purchase by the Government of 59 tracts of land with a total of 66,880 acres in the Appalachian and White Mountains. Of this, 36,000 acres is in the so-called "Kilkenny Purchase Area," in New Hampshire. It is the policy of the Commission to build up Government holdings, as nearly solid as may be, through buying only in certain specified places, which are designated purchase areas.

The Kilkenny Purchase Area adjoins the so-called "White Mountain Purchase Area" on the north, and is on the water-shed of the Connecticut River. The land now approved for purchase is the first to be acquired in the Kilkenny Area. About 17,000 acres of land on the White Mountain Area was approved. This land lies for the most part on the west slope of the Carter Range and practically completes the Government purchases in the northern portion of the White Mountain region. With this land a total of 698,086 acres in the White Mountains has been acquired.

Smaller tracts were purchased in the southern Appalachian Mountains, the largest total of any area being that of 7,678 acres in Transylvania County, North Carolina, on the Pisgah Forest. Other tracts in Avery, Caldwell, Macon, and McDowell Counties, North Carolina, on the Boone, Nantahala, and Mount Mitchell Areas, aggregate 1,870 acres. Approximately 2,000 acres of the approved lands are on the Potomac, Shenandoah, and Natural Bridge Areas in Virginia; 956 acres are in Rabun and Union Counties, Georgia, and the remaining 586 acres are in Monroe and Sullivan Counties, Tennessee.

The $3,000,000 recently reappropriated by Congress will be used mostly to round out the lands already acquired, so that they may be easily and economically administered. In making future purchases it is stated that the policy will be to select those tracts which block in with lands already purchased and which are offered at the most reasonable prices.

Forestry for Boys and Girls

by Bristow Adams

Is Jack Frost the Real Artist?

"Jacky Frost, Jacky Frost,
Came in the night;
Left the meadows that he crossed
All gleaming white;
Painted with his silver brush
Every window-pane;
Kissed the leaves and made them blush,—
Blush, blush again!"

SO SANG "Toto," the youngest boy, keeping himself cheerful during an enforced stay in bed with a bad foot. He will climb and jump with no heed to the limit of his strength or skill, until he bumps into that limit pretty hard, as in the present case. He was making a brave attempt to have a good time in spite of the hurt and the bandages, so his mother and the rest of us were seeking ways to help him keep his mind off his troubles.

"About that song—" said I, "it's a nice song, and I like to hear you sing it. But does Jack Frost really do all that?"

"'Course he does," he maintained stoutly; and the rest of the children joined their evidence to his. "Haven't you seen it? Don't the leaves turn red when he comes?"

"Yes; but let's look into that. Do you remember the gum tree that had the flaming red branch in August? Jack Frost hadn't been here then."

"What does turn the leaves red and yellow?" he asked.

"They turn themselves, and they'll turn at the right time, frost or not."

From that, we talked over the whole subject, and this is what we got out of it:

BRIGHT-colored autumn leaves seem to depend on the place and on the kind of tree. Two places in the world the autumn leaves have more color than anywhere else; these are in the northeast parts, generally speaking, of the two great land divisions of the Old World and the New, or in Japan and the nearby lands of Asia, and in Canada and our own New England. It is said that nowhere on earth is there the gorgeous autumn foliage of the northeastern United States. "Indian summer," so they say, is named from the tints dear to the eye of the savage, and is an American institution.

Yet place does not mean everything. American trees are used in the parks of England to add the color that is lacking in the native trees, for high lights in landscape art. Persons in California, who miss the bright leaves generally lacking on the west coasts of the great land surfaces, try to make up for the loss by planting eastern trees. I remember in the collection of trees, or arboretum, at Stanford University, where there is not much cold weather and where palms thrive, there are some trees of brilliant hue, and I found that about all were from New York and New England. Their colors come each year even though the leaves may drop before a frost comes. Trees in the Arnold arboretum near Boston, which have come from regions where gay autumn tints are unknown, just keep their green color alone, even though their Massachusetts cousins put on scarlet and gold.

IT MAY be the kind of tree, after all. We plant Japanese maples for their bronze, or red, or yellow color, and they keep the same shade whether they are in the City of Washington or in the State of Washington. The Chinese gingko turns to its tawny yellow no matter where it grows. Take the "wayfarer's tree" or viburnum; there are many kinds over Europe, Asia, and America. In Europe, the leaves of all are about the same color, simply green. Many American kinds show beautiful autumn tints. Virburnums from other countries planted here, stay about as they were where they came from, while our viburnums, taken to other parts of the world, turn quite as vivid in their strange homes as they did here.

Let us say, then, that something in the tree makes the color, and that these colorful trees grow naturally in certain regions. Scientists have long words to tell about the color changes. I know one man who has written a whole book about the changes in just one kind of grape leaves; and he thinks he does not know a great deal about it, even yet.

THE LEAF is not just a simple layer like a sheet of paper, but has an upper and lower, an inside and an outside skin, with other layers between. We had seen how a locust-leaf miner ate the inside out of the leaves and left only the brown shell of the outer walls. Another insect leaf-miner makes queer light curlycue channels in the columbine leaves of the flower-garden, by eating out the green stuff between the upper and lower layers.

When the leaves have finished their work, the useful green stuff, or "chlorophyll," breaks down and is sapped up. Cool weather may hurry this process of dissolving the green part, but the changes would take place just the same without frost.

The good food for the tree, such as the sugar of the sugar maple, passes from the leaves back into the twigs and branches, so that it is not lost. When the leaves fall, therefore, they are only the shells of themselves. Part of the flaring color of many trees, by which they really seem to shine, is due to this. The sunlight, no longer stopped by the shade-making green, filters through the leaves, and makes the birches seem to give out a light of their own.

In the passing of the food from the leaves for storage in the stems, it must be kept from the strong action of light; it is thought that the changed color partly helps this. The very young leaves of many plants show these colors in early spring. We see them in ruddy young oak shoots, in unfolding maple leaves, in the downy pinkish leaf buds of the grape. There is said to be a need, also, of protecting the food material as it passes out into the leaves. This may be one of the purposes of "carotin," the yellow color in plants.

WHEN the foods have passed into the tree, it has a clever way of corking up the hole where the leaf-stem was, and of sealing over the place. Thus, when its work is done, the door is closed behind the leaf, and it can sail away.

There's another good reason for the fall of the leaves before the snows come; because if they did not let go, tons of snow and ice would cling to them and break the tree down, or at least crack off its branches.

SO WE all agreed that Jack Frost had been given too much credit, and that the real facts were more wonderful than the tales about Jack making the leaves blush by his boldness or by painting them with brush and palette.

"I'm a-going to keep on singing that song, just the samee," announced Toto, "'cause I like it!"

"To be sure you are," I agreed. "If we sang only such songs as were written in the cold light of science, we'd forget how to carry a tune."

And all together we sang about Jacky Frost, to show that we bore him no ill will.

War-Time Uses of Forest Products

By A. W. Schorger

Chemist in Forest Products, Forest Products Laboratory, Madison, Wisconsin

ONE of the mysteries of the present war is the source from which Germany obtains the nitrocellulose necessary in the manufacture of smokeless powder, and ordinarily made from cotton. A well-defined belief exists in England that at least part of the nitrocellulose needed by German powder factories is being made from wood; and if this is true it furnishes another instance of the surprising dependence upon wood, in one form or another, on the part of the fighting nations. The actual extent to which forest products are put to use in time of war, both for military purposes and for supplying the nation with some of the things it needs to carry on its daily life, is not generally recognized. Conditions, of course, have changed vastly since the day when Pepys offered up thanks in his diary for "the very good news of four New England ships come home safe to Falmouth with masts for the King; which is a blessing mighty unexpected, and without which we must have failed the next year. But God be praised for this much good fortune, and send us the continuance of His favor in other things."

Wood has ceased to be a large factor in ship building. Sea battles of to-day are fought by all-steel dreadnoughts; even the wooden backing of the armor plate is giving way to other material. Wooden decks alone remain to link the old fighting ship with the new. But warfare on land has developed in a way to give timber an importance in field operations it never had before, while the vast number of accessories needed for the smooth running of the modern fighting machine, from ammunition to absorbent cotton, have led to an extraordinary demand for certain forest products, and have even brought about new uses for wood born of necessity and unheard of a few years ago.

For one thing, there is the matter of explosives. Ordinary black powders contain about 75 parts saltpeter, 10 parts sulphur, and 15 parts charcoal. The charcoal employed must possess special properties, and is made largely from dogwood, willow, and alder. In spite of the advent of smokeless powders, enormous quantities of black powder are still used. It is employed in shrapnel, for which only a moderately powerful explosive is required to drive the bullets. Besides, the smoke produced when the shell explodes is an actual advantage in enabling the gunners to determine the correct range. Black powder is also used to fill the rings of the time fuses with which shrapnel shells are equipped, for which purpose no satisfactory substitute has yet been found. Furthermore, it is used in most armor-piercing shells, which should attain great penetration before they go off, and for which the majority of high explosives would be unsuitable because of their explosiveness on contact. Another product of the forest, resin, is employed for filling the spaces between bullets in shrapnel, so that on explosion the missiles will be evenly distributed in all directions. Its brittleness and, at the same time, its hardness, together with its low melting point, fit it admirably for the purpose.

The period since the beginning of the war has witnessed a great amount of discussion in England as to whether Germany is actually employing wood from which to make the nitrocellulose for her smokeless explosives. When, after a long delay, England declared cotton contraband of war, it was maintained by many that this would not inconvenience Germany greatly, since she was already making explosives from wood cellulose. During the discussions that followed, it was proposed to destroy the forests of Germany by a giant fleet of aeroplanes armed with bombs; however, as one English editor naïvely remarks: "This would scarcely be feasible, since about one-third of Germany is forested."

As a matter of fact, little or no reliable information exists in regard to Germany's use of wood for nitrocellulose, and expert opinion in England differs widely about the matter. Sir William Ramsey believes that such explosives are being made, and Mr. Walter F. Reid, who introduced the important gelatinization process in the manufacture of smokeless powder, is emphatic that a nitrocellulose can be made from wood pulp that is equal in every respect to that made from cotton. On the other hand, Mr. Clayton Beadle, whose opinion is entitled to great respect, holds that the difficulties attending proper purification of the wood cellulose previous to nitrification are all but insurmountable.

However this may be, records published by German scientists before the war show that a high explosive can be manufactured from wood cellulose, though at that time its stability was questionable. While it required forty years of experiment to render gun cotton stable, anything like the same time might not be necessary in the case of wood cellulose, for the experience with gun cotton should facilitate solution of the present problem. It is highly probable that the chemical difficulties have already been overcome.

In this connection, it is an interesting fact that the first successful smokeless powder was made from wood about 1865. This powder, invented by Schultze, consists of a mixture of saltpeter and nitrated purified wood. While inferior to gun cotton in ballistic powder, it still retains high favor among sportsmen. Various other explosives, known as "white powder," "yellow shooting powder," and "Bautzen blasting powder," contain nitrated lignocellulose.

Aside from munitions, wood is serving many useful

purposes in the war. Millions of gunstocks are made from American walnut, which is the best wood yet found for the part. A new rifle, it has been estimated, is required monthly for every man at the front. In the modern infantry weapon the wooden stock is prolonged to the end of the barrel, which means just so much more wood needed in its manufacture. So great, in fact, has been the demand by gun makers for seasoned walnut that it has often been necessary to use birch and other woods as substitutes.

With characteristic foresight, the Germans brought portable sawmills with them into France, and have utilized their enemy's forests to supply their need for timber at the front, while reserving their own forests for home demand. The development of trench warfare, when vast armies of men dig themselves in on fronts hundreds of miles long, calls for an amount of timber for trench walls, floors, and braces that is difficult to estimate. Millions of feet of lumber are required also for temporary buildings behind the fighting line and for housing non-combatants made homeless by the fortunes of war. Still more goes into bridges, wharves, and the like. High explosives have made it possible for a retreating army to destroy stone and steel structures behind them in short order, and such structures the pursuing army must have the means of quickly replacing. Wood is, in most cases, the only material that will answer the purpose, and it served the German army in good stead during the pursuit of the Russian army through Poland.

Turning from the materials needed for actual fighting to the no less important ones required for proper care of the wounded, we find Germany, fully prepared for England's embargo, making a soft, absorbent surgical cotton from wood cellulose. Two factories in Sweden also are making this substitute. Slings are made from tough crepe paper, and splints from fiber boards.

Wood is also contributing to the personal comfort of the men at the front. Russian soldiers are wearing paper shirts made in Japan, where such clothing has been in use for many years. The chief raw material for the manufacture of paper is, of course, wood pulp. Paper clothing is warm and cheap, and special water-proofing processes are overcoming its tendency to tear when wet. It may be discarded when soiled, an advantage to the soldier from the standpoint of hygiene. The Germans and Austrians, mainly the poorer classes of the civilian population, use paper vests, socks, and handkerchiefs. Blankets and coats are padded with cellulose wadding. So many paper articles, in fact, are produced for the comfort of the people of Germany and Austria as to lead the Socialist organ, *Vorwaerts,* to declare, "To be without wood is almost as bad as being without bread."

To insure the presence of every factor that tends to eventual success, a country at war needs to maintain its economic conditions as nearly as possible at their normal level. Products of the forest play an important part in many peaceful industries which must be kept going in war time.

Methyl alcohol, the other product besides acetic acid obtained from the destructive distillation of hardwoods, has a multitude of uses. For one thing, it is essential in the manufacture of many medical preparations. For another, it is employed in the making of aniline dyes, the scarcity of which is being felt throughout the world. It is the source, also, of formaldehyde, one of the safest and most efficient antiseptics known, for the manufacture of which large quantities of wood alcohol are exported to Europe.

The longleaf pine forests of the South furnish 90 per cent of the world's supply of turpentine and resin. In normal times turpentine is used mainly as a solvent in the arts. It is entirely possible, however, should the need arise, to make from turpentine a synthetic camphor as good for practical purposes as the natural product. In the event of the blockade of the Pacific Coast, this should be the means of preserving our celluloid industry, which now consumes the greater part of the 5,000,000 pounds of Japanese camphor imported annually.

Resin, the use of which in shrapnel has already been mentioned, is employed mainly in the manufacture of cheap soaps and as a size for paper. So acute has become the scarcity of resin in Germany that the Prussian Minister of Agriculture has suggested such measures for increasing the supply within the empire as distilling resinous wood and collecting the oleoresin which exudes from trees peeled by deer. Prices being paid for resin by the Central Powers are almost fabulous. Curiously enough, a substitute for paper size, recently proposed by a German scientist, has wood tar as its base.

In connection with the use of resin as size for paper should be mentioned the fact that in time of war the demand on the forests for print papers deserves serious consideration. Of the 6,000 newspapers and periodicals in Germany and the 3,000 in Austria at the beginning of the war, it is estimated that some 1,100 of the German and 900 of the Austrian have since suspended publication either through inability to obtain paper or because of its prohibitive price. Germany has always imported large quantities of pulp wood from Sweden and Russia, so that cessation of importation of Russian pulp wood and American resin is a partial cause of the trouble. On the other hand, German war literature has been augmented by some 7,000 books and pamphlets since the beginning of hostilities; and it is the invariable rule in all countries that the demand for newspapers and periodicals of all kinds increases enormously in a time of national crisis. The total daily circulation of French newspapers before the war, for example, amounted to approximately 7,000,000 copies. Their circulation has now increased to 15,000,000 daily, in spite of the suspension of a number of journals. The bulk of print papers is made from spruce and balsam fir. Experiments at the Madison Laboratory of the Forest Service have shown, however, that satisfactory newsprint paper can be made from some seven or eight other American woods, which places the United States in a position of preparedness, at least so far as the production of paper is concerned.

The binder twine, used everywhere in the United

States in connection with harvesting our crops, is at present made from sisal imported from Central America and Mexico. As a result of the disturbed conditions in Mexico, American twine manufacturers are seriously embarrassed for raw material. A substitute has been sought in paper twine, and experiments in this direction are still under way.

Strong cordage, ropes, burlap, and similar articles can be made from paper, and, in fact, are being made from it. Our common burlap and course bags are ordinarily made from imported jute. Shortly after war was declared the price of burlap bags increased so greatly that one large grain dealer seriously considered taking the profit to be derived from the sale of his reserve stock of bags and going out of business. In the case of a war of our own, the United States should be in a position, through its enormous supplies of wood fiber, to meet all, or at least the great part of, its needs for the twine necessary to harvest its crops and for substitutes for burlap bags and hemp ropes.

The American public, perhaps unawares, has long been accustomed to articles of clothing made from wood under these terms "fiber silk" and "artificial silk." The viscose process transforms wood pulp into a strong, durable, lustrous thread that may be woven into any desired fabric; accordingly, the morning newspaper and handsome cravat may have a common origin.

Finally, should the South ever be invaded and its cotton crops seized, a happening which military and naval authorities regard as not at all unlikely in case of war with a strong power, the cellulose from our forests would have to serve us, not alone for explosives, but for textiles as well. Thus, in more ways than in the production of lumber, the forest may serve a nation called upon to meet the conditions of modern warfare, and for that matter, too, of commercial progress in times of peace. Nor is it beyond the bounds of possibility that the investigations and experiments which are being carried on at the Government's Forest Products Laboratory and elsewhere may find still other uses for wood that will add just so much more to the importance of the forest in our national life.

Under Fire in War Zone Forests

(Passed by the Field Censor September 13, 1916)

By Lieutenant H. K. Robinson

Twenty-first Howitzer Battery, Canadian Expeditionary Force

INFORMATION as to the changes in forest management in the war zone, caused by the change in supply and demand brought about by the war, might easily be considered to be of military value to the enemy and so rejected by the censor, and as I am not allowed to name any places I might write about, I will merely give for the readers of American Forestry some general information regarding forest conditions in northern France.

Speaking generally, the artillery, machine gun and rifle fire appear to have surprisingly little effect on broad-leaved woods and seem to kill outright the coniferous woods, if close up to the front line trenches. I have seen many oaks, beeches, planes and other hardwoods badly knocked about by shell fire and yet vigorous, while Scotch pine, spruce and other conifers have died after being worried a bit by splinters or shrapnel bullets. Woods near the front line always come in for a good deal of shelling as they are a cover from view by hostile aircraft. It is easy to imagine quantities of engineers' stores and ammunition depôts and infantry dug-outs under their cover, so a wood in range of hostile artillery is by no means the safest place in which to loiter. I have often seen a sudden, intense fire opened on a wood for two or three minutes, apparently in the hope of catching people in it unawares. I know one such wood which has been shelled almost daily for many months, both with high explosive shells bursting on percussion and with shrapnel, and the front of it swept at frequent intervals with machine gun fire. If you were to visit it now, all you would notice are the shell holes in the ground, which are very numerous, and a few trees rather damaged by direct hits or splinters. The wood, as such, has suffered no damage whatever.

I remember a blank piece of road embankment which was some distance behind the German front line. It seems to have offended the eye of some really cultured enemy, for one day we found it had been neatly planted with young pines about one metre apart. This irritated my major, M. N. Ross, formerly of Biltmore, and now landscape architect to the Government of Saskatchewan. He thought it looked as if the German was behaving as absolute owner and not merely as a sojourner in thus beautifying the place. So the next day a shell from our battery landed in the middle of it. We had to shell that road and this was as good a point as any and shells sometimes drop short a few yards. Our shells make rather a mess and that one left only three pines standing at the edge of the bank. The damage was never repaired and I fear that that tree lover, probably from South Germany, regards us now as Philistines of the worst sort.

I believe the Germans, taken all round, use far more forest materials for their war work than we do, but that

is only natural, as their minds run more to timber than do the British, a result of the greater per capita wood consumption of Germany than of Great Britain in peace times. It is to me one of the most striking differences between their trenches and dug-outs and ours. It is interesting to notice the bird and animal life to be seen almost everywhere along the battle front. They seem in no way put out by the firing and very seldom do you see any killed. I remember only two cases, one a hare killed by a small piece of a shell, and the second a swallow whose head was taken off by a shrapnel bullet. A large number of his feathers went to Canada in letters from our gunners, mostly to ladies, and with suitably pathetic comments. The battery officers have to censor the outgoing mail.

This letter is being written under some difficulties, as there is a steady bombardment going on and the acetylene lamp goes out about once a minute from the concussion. What beats me is why it stays alight so long. I suppose there must be a gun firing straight over this dug-out at the rate of one per minute.

Back in the spring I noticed a bird jump every time a gun went off or a shell burst and I wondered at him. Through my telescope, however, I saw that he was a migrant and the first of his kind I had seen this year. I wonder what he thought about it?

I am informed that the wild pigs in the firing area could not stand the noise at any price and have appeared as much as sixty miles away in woods where they were quite unknown before.

I am inclined to think that the area under forest in the war zones will be increased after the war, as there is so much destruction being wrought that the owners, if living, will not have the heart or means to reclaim the land for farming, and the armies have used so much wood that timberlands will look like a good investment to others.

NEW HAMPSHIRE CONFERENCE

THE Forestry Conference under the auspices of the Society for Protection of New Hampshire Forests was held this year at the Crawford House, Crawford Notch, New Hampshire, in the midst of the National Forest purchase area, and adjoining the state forest of 6000 acres which protects the slopes of the Notch. The meeting was largely attended. William L. Hall, of the Forest Service, explained the policy to be pursued in managing the lands acquired by the government, which now total over 300,000 acres in New Hampshire alone. The forests on these areas are to be utilized to produce revenue, part of which, under general statute, is paid to the counties in lieu of taxes. Every precaution is taken to preserve the scenic beauty of the forests and to avoid fire risks.

Mr. W. R. Brown, member of the New Hampshire Forestry Commission and a director of the American Forestry Association, presented, in a carefully prepared paper, a plan for mutual fire insurance of standing timber. Printed copies of this paper can be obtained from him at Berlin, New Hampshire.

Dr. B. E. Fernow, Dean of the College of Forestry at Toronto, in a talk on forestry of the past and future, advocated the extension of public holdings of absolute forest land as the most effective method of securing forest production. In a discussion following, as to the merits of attempting to regulate the cutting of timber on private lands, he brought out the fact that Prussia, the most autocratic of all German states, preferred to buy poor sandy soils and manage them as state forests rather than attempt to force the owners to practise forestry against their will.

The woodlot was discussed by Professor F. Roth, Director of the Michigan Forest School at Ann Arbor, who told about methods of estimating its standing timber,—and by Professor J. W. Toumey, Director of the Yale Forest School, who advocated commercial planting for the establishment of woodlots and cited a tract of three acres planted to white pine in 1891 near Keene, New Hampshire, on land too steep to cultivate, which sold last year for $1000, or $333 per acre. A lantern-slide lecture was given by Mr. Shurtliff, landscape architect, under whose direction vistas and other cuttings have recently been made to permit tourists to obtain views of the mountains from the road traversing the Crawford Notch.

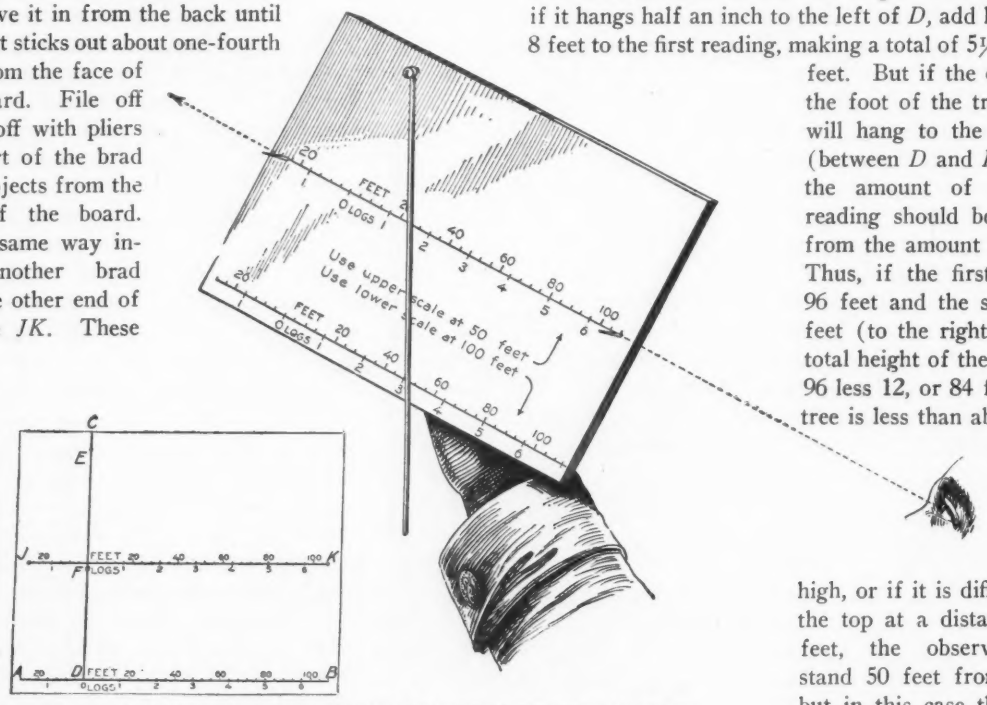
An important conference was held at this meeting by the Interstate Committee on the White Pine Blister Rust. Progress reports by government agents and state foresters who have been operating under the recent federal appropriation of $30,000, showed that this summer the disease has spread upon currant bushes over wide areas in every New England state, and is present in Minnesota and Wisconsin. Testimony was presented showing that the spores may be borne distances of from two to twenty miles on the wind, producing infections of the currant leaves which, in the fall, will infect white pines in turn. Legislation was recommended which will give to the state officials the necessary power to combat the disease. It was decided, as a result of the conference, that a united and determined effort be made by every state to get control of this rust before it is too late. Specimens were shown of the disease in young white pines, and evidence given of plantations now twenty feet high, in which the rust had infected every tree and was killing the entire grove by girdling the trees.

Many persons are mistaking a browning of the needles of the white pine for the presence of blister rust. This effect has nothing to do with the rust, which is wholly a bark and wood disease. The browning of needles is caused by climatic factors not wholly understood, and most trees recover.

THE stand of timber on the two great National Forests in Alaska is estimated by the Forest Service as over 70 billion board feet, while the annual growth will, it is said, produce of pulpwood alone enough for the manufacture of three thousand tons of wood pulp a day.

How to Measure Height of Trees

AN instrument for measuring the heights of trees can easily be made at practically no cost. Take a piece of half-inch board 7 by 9 inches and plane it smooth on all sides. Draw the line *AB* ⅜ of an inch from the lower edge and parallel to it. Two inches from the left end of the board draw *CD* at right angles to *AB*. Make a mark at *E*, 6¼ inches from *D*, and another at *F*, 3⅛ inches from *D*. Now draw a line *JK* through *F* parallel to *AB*. Start at *D*, lay off inches and quarter inches on *AB* in both directions, marking *D* as zero and putting down the number of inches from *D* to each inch mark. Do the same for the line *JK*. Take a brad or small nail and drive it in carefully on the line *JK* about an inch from the edge of the board. Drive it in until the point comes out on the back of the board; then pull it out and drive it in from the back until the point sticks out about one-fourth inch from the face of the board. File off or cut off with pliers any part of the brad that projects from the back of the board. In the same way insert another brad near the other end of the line *JK*. These brads are the sights, and it is important that they be straight and true.



A SIMPLE HOME-MADE INSTRUMENT FOR MEASURING HEIGHTS OF TREES

Now take a piece of straight, heavy wire 10 inches long, and bend one end of it into a loop about an eighth of an inch in diameter. The center of the loop should be in line with the straight part of the wire. Fasten this piece of wire loosely to the board at *E* with a half-inch screw, so that it will swing freely when the board is on edge. The loop should be big enough to fit loosely over the shank of the screw, but small enough so that it will not slip off over the head.

Screw a piece of wood about 6 inches long, 1 inch wide, and half an inch thick to the back of the board to serve as a handle, and the height measure is complete.

How to use it.—To measure the total height of a tree, stand at a distance of 100 feet from it and hold the instrument in the right hand in such a way that the pendulum swings freely but very near the board. Sight along the brads at the top of the tree and let the pendulum come to rest. Then with the left hand press the pendulum against the board without giving it a chance to change its position. Now read off the number of feet in height on the lower scale. If the wire crosses the line 5 inches from the point *D*, it indicates that the tree is five 16-foot logs or 80 feet high above the level of the eye. Now sight at the foot of the tree and take another reading. If the pendulum hangs to the left of *D*, that is, between *A* and *D*, add the amount indicated to the first reading, and the result will be the total height of the tree. Thus, if it hangs half an inch to the left of *D*, add half a log or 8 feet to the first reading, making a total of 5½ logs, or 88 feet. But if the eye is below the foot of the tree, the wire will hang to the right of *D* (between *D* and *B*) and then the amount of the second reading should be subtracted from the amount of the first. Thus, if the first reading is 96 feet and the second is 12 feet (to the right of *D*), the total height of the tree will be 96 less 12, or 84 feet. If the tree is less than about 75 feet high, or if it is difficult to see the top at a distance of 100 feet, the observer should stand 50 feet from the tree, but in this case the readings are on the line *JK*.

When the instrument is sighted the pendulum can be kept in position by tilting the hand slightly to the right. This brings the wire against the board and holds it in place so that a reading can be obtained. Care should be taken, however, so that the wire will not slip after the board is tilted.

In the example given, the total height of the tree has been measured. It is often of more practical importance to measure the height to a point on the tree beyond which there is no merchantable saw timber. This measurement is made in the same way as that described above, except that the instrument is pointed at what will be the top of the last log when the tree is cut, and then at the point where the top of the stump will be.—*Farmers' Bulletin* 715.

Western Public Lands and National Forests

By Herman H. Chapman
Professor of Forestry, Yale University

THE policy of National Forest reservations will continue to be attacked as long as there exist persons whose fundamental creed is the doctrine of unregulated private exploitation of our remaining resources. One of the most plausible arguments advanced by these propagandists is that of the paralysis of state development through the retention by Uncle Sam of an immense proportion of the total area of these Western States, upon which of course no state taxes can be levied, and which, it is claimed, rest with oppressive blight upon these struggling communities, preventing all natural growth and development. Tables of areas have been quoted showing as high as 92 per cent of the area of a state, retained by a grasping government, with no relief in sight.

When half truths are quoted and impressions created by reliance upon the unfamiliarity of the reader with local conditions, it is necessary to let in the light.

Figures are now available to show not only the areas in public ownership, but the status of these lands, and their character.*

These statistics are best expressed in terms of per cents of the total area of each state. The States shown in the table below are the eleven western public land States containing National Forests and lying west of the plains.

The first fact shown by this table is that two-thirds (65.5 per cent) of all the national lands in these States are not reserved or retained, but are open to entry and acquisition, subject to all the public land laws, homestead, desert land, or other statutes and therefore have no bearing whatever upon the discussion. These lands are in public ownership to-day because they have not sufficient value for any purpose to justify private persons in acquiring title to them. Being valueless, they could produce no revenue in taxes were they to pass to private ownership, for individuals would not retain them. The character of these lands is either waterless, non-irrigable desert, or barren rocky tablelands, crags and bluffs.†

Yet these areas, unexplained, have furnished the backbone of the statistics cited.

There are reservations of land in these States for several purposes, but the only policy affecting large areas forming an appreciable per cent of the state, is that of National Forests. The total per cent actually reserved, shown in column three, is seen, in column four, to consist almost wholly of National Forest lands. There can be no doubt that these misquoted and unexplained statistics are aimed directly at the policy of National Forest reservations, and this fact is usually frankly admitted.

The National Forest areas equal 17.8 per cent of the total surface of these eleven States. Is this area too large, and is its retention a drawback or an advantage to the people of the States affected?

We must first consider the fact that all the mountain ranges of the West are included in these forests. There is some possibility of using desert land by irrigation. Mountain ranges are worthless except as a reservoir for snow. Vast areas are treeless rocks. It would be difficult to say what portion of these National Forests is worthless for any other purpose than watersheds, but it could easily equal one-half of their total area.

How about the other half? This constitutes the national timberlands, and includes all the more inaccessi-

PER CENT OF THE TOTAL AREA OF EACH OF ELEVEN WESTERN STATES, OWNED BY THE UNITED STATES, AND STATUS OF THE LANDS SO HELD

	Total per cent owned by United States	How divided		Division of land reserved for public purposes		Per cent of total area granted to State by National Government
		Unappropriated and unreserved lands open to entry	Reserved for public purposes	National Forests	Other Reservations	
Arizona	70.2	50.7	19.5	17.2	2.3	17.1
California	44.1	21.0	23.1	20.4	2.7	9.3
Colorado	49.6	28.5	21.1	20.2	.9	9.7
Idaho	65.5	30.6	34.9	33.2	1.7	12.2
Montana	43.4	23.8	19.6	17.4	2.2	7.3
Nevada	89.8	79.0	10.8	7.5	3.3	5.6
New Mexico	49.8	38.4	11.4	11.0	.4	16.2
Oregon	49.3	26.1	23.2	21.6	1.6	8.7
Utah	78.9	64.2	14.7	14.2	.5	17.3
Washington	30 8	4.3	26.5	23.0	3.5	9.0
Wyoming	68.2	50.5	17.7	13.5	4.2	9.8

*Senate Document 316, Part 2, Table 1, Sixty-third Congress.

†For location and character of these unreserved and unappropriated public lands, see Circular 420, Department of Interior, July, 1915.

ble and least valuable commercially of the Western forest areas. A large per cent of this timber must be kept as a mere watershed protection, since the cost of logging it may remain prohibitive. The remainder has commercial value or will have in time as markets improve, transportation systems are built and private stumpage is cut.

This residual area of commercial timber, not exceeding an average of 10 per cent of the area of the Western States, and probably nearer 5 per cent for the region as a whole, must form the basis of the whole contention, for it constitutes the resource purposely retained by the nation.

Let us first consider the claim that these Western States should receive as grants the lands in the National Forests. The government has been exceedingly liberal with all public land States both East and West of the Mississippi River. The final column in the table shows the per cent of the area of each Western State granted to the State from the public domain up to this time. The average area, weighted, is 11 per cent. The inclusion of South Dakota, Minnesota and Arkansas, each of which contains large National Forest areas, raises this average to 11.75 per cent.

By contrast, fourteen Eastern public land States have received in grants 12.25 per cent of their total area, almost an exact equivalent. The actual acreage granted to the Western States is, of course, far greater, due to their larger area. Florida is in a class all by itself. The Swamp Land grant secured to this State 58 per cent of its total area.

Any substantial grant of National Forest lands to Western States would be a discrimination in their favor as against other states; and there exists no valid argument for such additional land grants. The total gifts to Western States now exceed 80,000,000 acres, and this does not include the immense private grants to railroads.

The final argument for dismemberment of these National Forests is the plea for state and local revenue from taxation. This would mean that state ownership would be transitory as the State cannot tax itself, and that the desired goal is private acquisition of the timberlands. The old plea that agricultural lands are withheld from settlers has been so thoroughly exploded by wide publicity that even stump speakers find it an unprofitable argument. The question narrows down to that of private versus national ownership of the public timberlands, and the economic effect on local communities.

To the forest, private ownership will be destructive. These slow-growing species present no future for individual investment. In parts of the northwest coast it may pay to grow timber, but elsewhere, in the West, a clear cutting and the permanent ruin of the forest can be expected. By contrast, public ownership, as already proved, means methods which insure a second growth and a perpetual forest cover. The tax revenue derived from private timberlands will, therefore, terminate with the logging.

Furthermore, it is being conclusively shown that owners of private stumpage in these States cannot carry the burden of an annual taxation for standing timber for long periods. The effect of such taxes for an extended period of forty to fifty years is to practically wipe out the present stumpage value, and produce a chain of aggravated economic evils of which over-production in the mills is the most prominent symptom.

No move to increase the amount of privately owned stumpage is justified until these evils are overcome. State politicians who close their eyes to the welfare of the lumber industry, on which, to an enormous extent, the community prosperity depends, and look solely upon possible increase in revenue from taxes, are in the same class with land speculators who do not care what happens so long as they are given an opportunity to juggle with the values of timber stumpage now beyond their grasp.

But what is the effect of national ownership? In the first place, the absolute right of the nation to retain these forest lands is unquestioned. This principle was decided by the United States Supreme Court in 1835 and is admitted even by the most rabid opponents of the system.

Are the states without revenue from these forests? For on this point seems to hinge the whole weight of the argument.

A forest property, whether belonging to states or individuals, must be protected from fire. Idaho spends 2 to 4 cents per acre on her state lands for this purpose. Otherwise losses greatly exceed the cost of their prevention. The states would either have to spend huge sums on the protection of these areas or speedily shift this burden to private shoulders. At present, this entire cost is carried by the national government, which last year spent $5,281,000 on the administration of these areas. States could not do the work successfully for less; hence this is equivalent to a direct saving in state expenditures.

In the second place, the counties receive by national statute 35 per cent of the gross income from all sources, earned by the Federal Government from these forests, and free from the expense of collection and administration. The forests earned last year $2,481,469.35, and the states' share amounted to $610,797.75. This sum will rapidly increase as the resources of these forests are developed. In this connection, the sum of $244,319.10 out of the total of administration expense was spent to construct roads and trails.

Still a third source of revenue was provided this year by a congressional appropriation of $10,000,000 for the construction of roads within or partly within the National Forests, one-tenth of which, or $1,000,000, is available each year until expended. The effect of this law is to increase the return to the communities to equal two-thirds of the total income from the forests, and at the same time expend upon their administration a sum at present twice as great as the total of this income received; so that, if we consider administration expense as saved to the state, the community receives under the present plan from the government $2.77 for every $1.00 yield in income from the forest resources. In the narrower sense, considering only the income, the state is given 65 cents for every dollar earned, leaving 35 cents to the government or public at

large, as the equivalent of an expenditure of $2.12, which is the ratio of expense to income at present. The nation is, therefore, expending six times as much for the benefit of the states on account of these forests as it receives in net revenue from its own resources within the forests.

This course is justified by the honest intention of the government to hold out every possible incentive for local development, and by the enormous benefit both to these localities and to the nation at large from the perpetuation of the forest as a productive use for waste lands. The revenue, under national control, will be maintained perpetually and should continually increase. By contrast, we would have, under private exploitation, a period of excess during which states would endeavor to squeeze the largest possible amount of tax revenue from this timber, and the owners would use every effort to destroy it as quickly as possible by logging, to escape the burden, leaving a barren waste from which no further revenue could ever be extracted and which would revert to the state for unpaid taxes. The next step would be an attempt to secure the purchase of those ruined lands by the National Government for forest reserves.

The American Forestry Association is pledged to vigorously oppose all efforts to inaugurate such a cycle of ruin and folly and to continue to champion the principle that our remaining national timberlands shall be treated rationally as a productive business, managed by the nation for the benefit of the localities in which they lie and for the people as a whole.

SCOTCH FORESTRY PROBLEMS

A DEPUTATION from the Royal Scottish Arboricultural Society has waited on the Scottish members of the British House of Commons to urge the creation of a separate department of forestry in connection with the Board of Agriculture for Scotland. Its members admitted that the great value of forestry had only been recognized during recent years, and they argued that now was the time to make it a national responsibility, especially in view of the impending necessity of buying huge quantities of lumber to take the place of that destroyed during the war.

The argument was put forward that the great question of securing employment for the multitude of discharged soldiers which will fill the labor market at the end of the war is being very generally discussed; the value of such schemes makes a practical and immediate appeal to many. Afforestation is, in fact, as Lord Lovat, one of the spokesmen of the deputation, maintained, one of the cheapest ways of settling people on the land, at any rate in the Highlands. It would be possible to put one man on the land for every 100 acres planted, and later one man to every 25 or 50 acres. He thought, moreover, there were certainly not less than 2,000,000 acres, in the Highlands alone, suitable for forestry. Every man settled in these Highland glens in connection with afforestation would be a definite addition to the population and would displace no one.

FAMOUS FOREST BURNED

THE wonderful forest of Tatoi, the pride of the late King George of Greece, was destroyed when fire reduced to ashes the summer residence of his son, King Constantine. The tens of thousands of dollars spent in cultivating a flourishing pine wood, as an example of what might be done with forestry in barren Attica, have been burned up as completely as if the banknotes themselves had been thrown in the fire. Tatoi played a large part in the history of Greece. Here the Spartans established themselves in 413 B. C. to cut off the supply of grain and foodstuffs bound into Athens from Eubea, with the purpose of starving out the Athenian population. And in 404 B. C., while Lysander blockaded Athens and the Piræus by sea, the Spartans descended from the vicinity of Tatoi, attacked and forced the capitulation of Athens, ending the Peloponnesian war. The burnt forest, laboriously planted and protected, was considered to be a memorial to the past greatness of Greece.

SOME IDEAS IN TREE PLANTING

By Sterling Rouse

ONE of my neighbors, Charles Moore, had thirty-three peach and apple trees to plant last spring. Part of the orchard site was in stubble and part in blue grass sod.

I decided to try a method new to this section on the sod land. With a spade I first cut the sod in a four-foot circle and turned it back out of the way. I then put down a bore-hole about thirty inches deep and loaded each hole with a half stick of low-grade dynamite to loosen up the subsoil. After filling the cavity at the bottom with subsoil and manure, the trees were set and rich top soil used to fill in around the roots. The sod was then laid on top of all around the tree, grass-side down. This proved fine for holding moisture in the ground and delayed the growth of weeds.

Another idea new to this region was employed in his old orchard. He had some apple trees that had never borne fruit. I used a stick and a half of dynamite to blast out each tree and then set the young trees in the holes made by the blasts, thus killing two birds with one stone as it were. The trees were planted in the same way as the ones put in the sod land. They are all doing finely. The cost of setting the trees was 10½ cents per hole.

Mr. Moore also had some black stumps he had been working around for ten years; he had tried burning them, but as the roots were near the surface, they interfered with his plow and harrow. These stumps ranged from sixteen inches to three feet in diameter. In two hours, I had them out, at an average cost of thirty-three cents per stump. He said he wouldn't work around them again for twice the cost of getting rid of them; that he never realized how little it would cost to dispose of them.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

THE TREE CENSUS

BY A. OAKLEY SMITH, *Park Commissioner, City of Mount Vernon, New York*

IN the present day of system and high efficiency, it is necessary for the manager of any business or organization to have a very accurate knowledge of his stock, territory and working capital; and the newly appointed city forester, or city arborist, is no exception to this rule. In fact, when such a department is being organized, it is well to spend considerable time in a preliminary survey in order to get the situation well in mind before mapping out a course of procedure, and very early in the game one sees the value and necessity of some form of a tree census.

The question arises, What form is best adapted to the particular case in hand and for what reason? The different styles already tried vary greatly in detail, accuracy and expense of production. The simplest form is a mere tabulation on sheets of paper, or in books, of the number and species of trees found along the different streets and a few notes as to their condition.

The other extreme is the card index system, which devotes one card for each block in the city and has every tree accurately located, the species, size and condition being indicated by symbols and notes. When completed, you have an entire map of the city dissected and filed by blocks.

Such a tree census is no doubt extremely accurate and valuable, but, can the department justly afford the expense at the beginning of its career when every cent counts? The expense in time and trouble of keeping this system up to date, even after completion, makes one question its desirability even in later years when the Shade Tree Commission, or similar body, is well established. The initial cost necessitated by a field crew of three men and expensive office work certainly makes this elaborate census impractical during the first years, especially as the important facts may be obtained by cheaper methods.

This method, finally adopted in Mount Vernon, New York, was designed to gain only the data of practical value and at a minimum expense and seems to have fulfilled the requirements. The field work is done by one man and data are taken on cards 5 inches x 8 inches ruled as Figure 1.

In tabulating the trees they are thrown into one of three classes. The *Sapling Group* includes all trees up to 5 inches caliper or 25 feet high and represents the potential capital, trees not yet of actual value as shade trees.

The *Thrifty Group* comprises all vigorous trees above the sapling group which may be expected to remain intact for at least five years. This group represents actual capital of growing stock on hand. This thrifty group might be broken up into diameter classes but the expense thereby added does not seem to be warranted. A general idea of the size of this class is noted by recording the average diameter for each block. All the trees visibly failing or not expected to be standing for five years hence are classed under the head *Old*.

One of the most important functions of a Shade Tree Commission is to plant trees, and in order to have a fair distribution of planting over the city and make the greatest showing with the means at hand it is necessary to know how many trees are needed in the various sections of the city. These data are readily recorded on these cards block by block. Another important item is that of giving proper protection to the trees by guards. This infor-

SHADE TREE COMMISSION, MOUNT VERNON, N. Y.

SECTION: DATE

Average diameter of thrifty trees of section

Total number needing guards

Number of trees to be planted

NOTES:-

	Norway Maple	Sugar Maple	Red Maple	Silver Maple	Sycamore Maple	Elm	Linden	Horsechestnut	Am. Sycamore	Oriental "	Red Oak	Pin Oak	Black Oak	Scarlet Oak	White Oak	Ash	Carolina Poplar	Catalpa	Sweet Gum	Sour Gum	Tulip	Locust	Cherry							TOTAL
OLD																														
THRIFTY																														
SAPS																														

METHOD OF KEEPING A TREE CENSUS

FIG. 1.—By this plan the trees are divided into three groups—Sapling, Thrifty and Old—and the work of making the census can readily be done at moderate expense, and on this account is preferable to the more detailed card index system.

mation is also noted block by block. Provision is made in the card to note any special conditions, as cavity work, insect trouble or other deficiencies. A glance at the card will show that all this information is recorded separately for each block, but one card is sufficient for an entire street of ten or twelve blocks. For convenience of management and operation, the city may be divided into five, ten or twenty sections, according to age classes, business districts and various grades of residential sections.

Figure 2 shows the ruling of card for section totals and a similar one may be used for the grand total of the city. Where the trees average 250 per mile one man may be expected to run four miles in an eight-hour day without rushing. The same type of card may be used in the field and in the office; the office work of transferring the data to clean cards takes barely a tenth of the time of the field work. The big argument in favor of this method is the relative low cost of securing all the information of real use. With such a census on hand an approximate financial estimate of the entire stock of trees may be easily computed by reference to a table of values based on sizes and species. Such an inexpensive census can be well afforded by any city undertaking municipal management of the tree problem and will be found to give real service.

SHADE TREE COMMISSION, MOUNT VERNON, N. Y.

STREET	SECTION							DATE					
	Norway Maple	Sugar Maple	Red Maple	Silver Maple	Elm	Linden	Horse-chestnut	Sycamore				Av. Diam.	Plant	Guard
TOTAL														
NOTES:-														

THE CARD FOR SECTION TOTALS

FIG. 2.—By the method used at Mount Vernon, New York, one man may be expected to make a census of 1000 trees in an eight-hour day, when they average about 250 trees to the mile.

ADVICE FOR OCTOBER

1. Prune all dead branches. The advantage of doing this work now before the leaves fall is because one can distinguish the dead from the live better at this time than in winter; because one can climb better now than in the winter when the trees are covered with ice and snow; because the branches are not so brittle and also because the trees will now suffer much less from bleeding, etc.

2. Take care of all wounds. Use coal tar and creosote to cover all exposed wood, and be sure to remove all decayed and diseased wood in the treatment of the wounds.

3. Destroy nests of the fall web-worm.

4. Fertilize with well-rotted manure all weak trees and evergreens.

5. Spray for scale insects, but before doing this determine the character of the insect and receive specific instructions as to the strength of the solution and what materials to use, as well as the best time for doing the work.

6. Thin apple trees and other fruit trees if necessary.

7. Pick off galls on small ornamental evergreens.

8. Plant deciduous trees and shrubs, but not evergreens. Poplars, magnolia trees, willows and oaks had better be planted in early spring, but other trees, such as maples, lindens, etc., can be planted in October.

QUESTIONS AND ANSWERS

Q. Is it advisable to start evergreens under box elder trees?

O. F., *Valley City, North Dakota.*

A. No, it is not advisable to plant evergreens under box elder trees. The box elder is a profuse grower, and shallow rooted, and will surely interfere with the food supply of the evergreens. Moreover, most evergreens thrive best where there is plenty of light.

Q. I would be very much indebted if I could receive a little information from you regarding a disease which apparently has attacked some of the white pine trees in Pike County, Pennsylvania. As yet the disease does not seem to be serious, as so far only three or four trees out of a possible fifty thousand have been affected on my place. The symptoms are that the leaf turns brown from the base of the stem outward until there is only a green tip left. All the leaves are similarly affected so that it gives the tree a rusty brown appearance until it dies. The disease which I am referring to, however, does not seem to in any way affect the bark as does the so-called white pine blight or rust. The rapidity with which it works when a tree is affected, however, is quite startling, the tree only living apparently a couple of weeks after it becomes affected. I am sending specimens.

A. H. H., *Staten Island, New York.*

A. An examination of the specimens of white pine which you sent me shows the disease to be one which is known as leaf blight. It is a physiological trouble, probably caused by some extreme weather conditions last winter, which have affected a small part of the sap wood through which the water is conducted from the roots upwards to the leaves. Hot, relatively dry weather, particularly when preceded by cool, wet weather, results in a greatly and unduly increased demand by the leaves for water. Until this time, the sap wood, only a part of which is affected, has been able to transmit sufficient water, but this sudden, much

increased demand has been greater than the diseased wood could supply. The result is a partial shortage of water supply among the branches which causes the scorching to appear very suddenly. This is the way the matter has been figured out by the specialist on pine troubles, after a thorough investigation of the sap wood and knowledge of the circumstances. We believe this diagnosis to be true, although it is not possible with our present facilities to actually prove it definitely by experiment. Records kept for several years upon diseased trees showed that most of them recovered the second year, and that only a relatively few died from the effects. So far as we can judge, there is no treatment which is likely to aid this trouble.

Q. I am enclosing a bay leaf, from one of the ornamental trees in our show-room. The tree is generally affected in this way and we would like to know what to do for it. Will you be good enough to advise?

F. R. C., *Hollywood, California.*

A. An examination of the bay leaf which you send shows that the tree is infested with sucking insects. The leaves should be washed, on the under side, with a solution of whale-oil soap, one pound to ten gallons of water, or with a solution of nicotine or tobacco dust. These insects are common on bay trees and the treatment may have to be repeated many times in the future. If washing the individual leaves is too big a task (depending on the size of the tree), then apply solution by spraying. You will find where the plants are kept indoors too much they are more likely to contract the infection.

Q. We have nine acres on the outskirts of Augusta, Georgia, on which are growing some very beautiful trees. We have three oaks, whose diameter will average about six feet, then there is a sugarberry whose diameter runs about eight feet besides perhaps a dozen wild olives whose diameters will run about three feet, and a cherry tree with a diameter of about three and a half feet and which is about one hundred feet tall. I mention these as an indication of the very fertile soil upon which these trees are growing. A few inches under the surface we have a red clay, which, judging from the growth of the trees and vegetation in our garden, must be well suited for plant life. On this place we have two walnuts, black walnut. These trees will run something over three feet in diameter and are very fine specimens, but for the past several years we have noticed the ends of the limbs beginning to die, and it is quite frequent that we find dead limbs of considerable size. Last week I happened to be up there and was talking to two so-called "tree doctors" and they both pronounced the ailment "borers." They stated that same can be eliminated and the tree cured by spraying. The cherry also has a good many dead limbs and the men said that the same trouble was affecting it. Of course, a tree the size of these cannot be effectively sprayed, but is there not a wash that we can apply to the tree on its trunk and larger limbs that would help?

R. W. H., *Savannah, Georgia.*

A. It is quite common for walnuts of the size of yours to show dead ends. Sometimes the primary cause is old age and a hollow trunk and sometimes boring insects. Old walnut trees have a tendency to develop a decayed center and decayed pith in main limbs. If borers are present, then there should be seen on the outer bark a number of small holes which lead to the burrows of the grubs. In such cases, inject carbon bisulphid into the burrow and clog the hole immediately after injection with soap, so as to retain the deadly fumes generated by the carbon bisulphid within the burrow. Under any conditions, spraying the trees will *not* affect boring insects because the latter grub underneath the bark in the woody tissue and any application of poison on the outside to the bark or the leaves will never reach them. In the case of the cherry trees, if you see any gummy exudations from the bark you may suspect the presence of boring insects underneath the bark and the remedy in that case is to grub them out with a penknife and remove the borer bodily. Injections will not help because the gummy substance will not permit the injected material to enter the burrow. The knife is best in this case and here, too, do not spray if you are fighting a borer in the inner wood. It may also be wise to "cut in" the branches of the cherry to compact the crown. This will rejuvenate the tree and cherry trees respond to the treatment.

Q. I have a number of Silver Poplars on my place here that are in some way affected. Many of the leaves are drying up and falling off, others are turning yellow, and the tips of the new growth are drying up and breaking off. I am sending you a couple of these tips. You will notice in each of them is a spot where they are broken and which appears to be stung by some insect and each side of this sting the wood is *dry* for about one-quarter inch. About a month ago I first noticed that the trees were affected, and then discovered many small green lice *under* the leaves. I sprayed the trees twice with arsenate of lead, but after each application had a heavy rain. The lice *now* have disappeared but the trees look badly. If you can inform me what is the trouble and how to overcome it, I shall be indebted to you.

S. H. W., *Guilford, Connecticut.*

A. An examination of the leaves you send shows that the poplars have suffered from winter's frost and summer scorch, following frequent dampness. Last winter was a hard one on poplars as well as on other tender plants. Hundreds of poplars have been killed outright in Connecticut and in the vicinity of New York. This summer there was a series of hot days following days of extreme dampness, and this caused considerable scorch. Our advice would be to "cut the trees in" this fall. Cut in very hard, depending on the size of the tree. Cut off most of the ends and altogether make the crowns of the trees compact and bushy. There is no evidence of any special insect on the leaves. Whether there are any borers in the branches, only an investigation would show.

Q. I planted in my garden this Spring a number of fruit trees, apple, plum, pear and peach. They took root and came along well, but now the leaves are turning black and falling off. On the stems there are "bunches" of small green insects. Can you tell me what they are and what to put on the trees?

F. N. H., *New York City.*

A. Replying to your recent inquiry, the insects in question are small thrips, quite common on the under side of leaves in the summer time. Spraying the infested leaves, on the under side, with whale-oil soap solution, one pound to ten gallons of water, will destroy these insects. The season, however, is so far advanced that it is hardly worth while spraying this year, and I would suggest deferring it until early next summer.

Q. I have two very fine horse chestnut trees on my farm in Chester County which have just developed "rusty" leaves. The leaves particularly towards the lower branches are turning brownish, rusty and drying up. Can you tell me what to do? Perhaps you can tell me what the trouble is. Shall appreciate your advices.

F. B. F., *Haverford, Pennsylvania.*

A. It is quite characteristic of horse chestnut, both in this country and abroad, to have their foliage turn brown early in the summer. The cause is a fungous blight on the leaves. It will not kill the tree and a close examination will show that the next year's buds are already well formed. The direct responsible factor is drouth and one will, therefore, notice more of this trouble on city streets than on open lawn and more in dry seasons than at periods when there is plenty of rain. Digging a shallow trench around the tree a few feet away from the trunk and constantly filling it with water will help to stay the difficulty.

Q. What can I do for our maple trees? All over town they are infested with tiny white cotton-like patches.

M. H., *Big Rapids, Michigan.*

A. Are they sugar maples or silver maples, and do the patches appear on the twigs or the trunks? If they are sugar maple trees and the patches are on the trunk, then the trouble is an insect and the thing to do is to wash the affected parts with whale-oil soap solution, one pound to ten gallons of water. If they are silver,

or red maples and the infestation looks like pop-corn on the slender twigs, it is the cottony maple scale and in this case clip off the affected twigs.

Q. I noticed quite a number of holes around the trunk of my walnut tree, but I am not sure as to whether these holes were made by borers or woodpeckers. It has been suggested that we bore one-inch holes about three inches deep every eight or ten inches circling the trunk of this walnut tree and filling these holes up with sulphur, the idea being that the sap as it goes up would become somewhat contaminated with the sulphur, which is slightly soluble, and this in turn drives off the borers—they evidently not liking the sulphur flavor. We understand this works very well indeed with oak trees, and I was just wondering if it would not be wise to try this on the walnut tree.

J. L. H., *Atlanta, Georgia.*

A. With further reference to your walnut trees and the suggested method of treatment, I must tell you that I have no faith in the sulphur method, as suggested. It has been tried by our specialist years ago in several species of trees and it never worked. Moreover, considering the growth and requirements of trees, it does not seem reasonable that it should work. Woodpeckers generally do not bore as deeply as insects, and very frequently they form a ring of holes around the tree, while the burrows of insects are usually scattered all over the bark.

Q. I have several nice pear trees on my place in Thompson, Windham County, Connecticut. Up to about six weeks ago, they looked to be thriving nicely, were full of good fruit and the leaves were green and healthy, then they commenced to turn black and fall off. Now in some places the trees are bare of leaves and the fruit has stopped growing, and will be of little use. What is the cause and is there a remedy? E. W. S., *New York City.*

A. I am sorry to learn of the condition of your pear trees. Your description answers a disease known as "fire blight," which has lately done considerable damage to pear trees all over New York State and also Connecticut. It has been known for many years, and cutting off and burning the infested parts is the only practical remedy I know of, and I sincerely hope that this will prove effective in your case.

Q. What shall I do to improve a linden tree that does not seem to grow? A. E., *New York City.*

A. Fertilize it with well-rotted manure. Dig the manure in and around the roots near their ends and not near the trunk of the tree. Mix the manure with the soil.

Q. When shall I prune my privet hedge?

J. B., *Brooklyn, New York.*

A. Almost any time. This is as good a month as any.

Q. Which of the oaks do you prefer for city street planting?

F. McK., *Philadelphia.*

A. The red oak for the heart of the city and the pin oak for suburban districts.

NORTH CAROLINA'S FOREST FIRES

LAST spring was the most disastrous to the forests of North Carolina from fire of any so far recorded. From an incomplete canvass made by the State Forester, reports were received of the burning over of more than three-quarters of a million acres of forest land and a loss of over $4,000,000 in property from forest fires. Eight counties in eastern, and one in western North Carolina, reported damages exceeding $100,000 each, while sixteen others lost more than $20,000 each; two counties reported damages of a million dollars or more. It is noteworthy that less than half a million dollars' damage was reported from the western half of the State, while more than three and a half million dollars was reported from the eastern counties. This is especially interesting in view of the fact that the fire protective measures that were taken were confined to the western counties, as the money came from the Federal Government under a provision of the Weeks Law which allows the spending of a limited amount for the protection of the headwaters of streams, provided coöperation can be secured from the State and the landowners.

The new State law in regard to forest fires is one of the best now operative in any of the Southern States. Unfortunately, the appropriation for enforcing it was not granted, so that the Federal Government has to be depended upon for what little protection it is possible to undertake. It is confidently expected that the next Legislature will make an adequate appropriation for this important work. This will not take the place of what the Federal Government is now doing, but, on the other hand, will enable the State to ask and obtain a very much larger Federal apportionment than it is now possible for it to receive.

NEW WAYS OF MAKING PAPER

THAT satisfactory wood pulp can be made from a number of heretofore little known woods is evidenced by a recent Government publication, which contains seventy samples of paper manufactured by different processes, chiefly from woods heretofore practically unused for this purpose.

It is pointed out that the spruce forests of the country are threatened with exhaustion and that the cost of spruce pulpwood has steadily increased. If the price of newsprint paper is to be kept at a reasonable figure, say the experts, more efficient methods of converting spruce into pulp must be developed or cheaper woods substituted for it.

The bulletin goes on to say that the method of manufacturing groundwood pulp has changed very little since its introduction into this country in 1867. It was with the idea of developing new methods and improving the old that tests were undertaken at the Forest Service laboratories at Wausau and Madison, Wisconsin. As a result, the relation of the different steps in the manufacturing process to each other has been definitely established and the merits of each treatment determined. The paper made from new woods was given a practical tryout by two large newspapers with satisfactory results.

The tests showed that eleven new woods give promise of being suitable for the production of newsprint paper, while a number of others will produce manila paper and boxboards. Most of these woods are confined to the West, while the groundwood industry now obtains the bulk of its raw material from the East. It is thought that pulp-making plants must eventually move to points where they can obtain a plentiful supply of wood and an abundance of cheap water-power, two prime requisites in the business.

Wood Preserving Department

By E. A. Sterling.

IN this department last month the reasons for the decay of timber were discussed. Since it is a well-established fact that wood-destroying fungi cause decay of timber, the next point is to determine what can be done to prevent this destructive action.

The first essential of a good wood preservative is that it shall kill the fungous growth which causes decay or make it impossible for the spores to develop. This toxic quality is possessed by many chemicals or compounds, but for practical purposes only a few possess the additional requirements that they shall remain liquid at ordinary temperatures, penetrate at least the outside tissues of the wood, be permanent enough to give continuous protection, and be safe to handle and apply. There is the further economic requirement that the preservative shall be of reasonable cost.

Many hundred preservative materials have been tried and abandoned because they were too expensive, or failed to meet one or more of the essential requirements. Long experience clearly indicates that coal-tar creosote is the best general preservative. It comes the nearest to meeting all the essentials and approaches the ideal because it prevents decay, is lasting in its results and is not too expensive for general use. It fails to reach perfection because there is some loss by evaporation, but mostly of the lighter, less valuable fractions, and it does not penetrate the dense, hardwood portions of some timbers. On the other hand, it is insoluble in water, remains liquid at ordinary temperature and is safely used under nearly all conditions. It has a strong pungent odor, but this disappears almost entirely after exposure to the air. Creosoted surfaces cannot be painted in light colors because the oils stain through, but the creosote itself gives a rich brown tone.

ANOTHER preservative which is extensively and successfully used is a mineral salt known as zinc chloride. This also is sufficiently toxic to kill wood fungi, penetrates the wood when in solution, and very materially increases the resistance of wood to decay. It is cheaper than creosote and would be universally used except for the fact that it cannot be successfully used by open-tank or brush treatment, and is not as effective as creosote when applied superficially. It is also soluble in water, which causes it to leach out to some extent from the outer portion of the wood.

Among many other materials which have been used as wood preservatives, but which have not received recognition, are tar, crude oil, linseed oil, whitewash and wood creosote. With the exception of the latter, it may be safely stated that they are not sufficiently poisonous, do not penetrate the wood sufficiently, are not permanent, or are too expensive for general use. Wood creosote has qualities which indicate a preservative value, but the results from its use are not fully established, nor is it generally recognized as a satisfactory preservative for the small consumer.

IN the case of patented or proprietary preservatives careful consideration should be given to their value in relation to cost. These include chemical solutions of various kinds, many of which have been quite extensively sold. Some of them, particularly those containing creosote, have high preservative value; others are practically worthless, despite extravagant claims. Most of them are high in cost and are rarely superior to refined or even crude creosote and often not as good. As a guide in considering the value of the many preservative preparations offered in retail quantities it should be remembered that there have not been any new preservatives of established value discovered or developed for many years. Trade name may be used for material of great value, but if this is the case, it should be ascertained whether or not the principal constituent is an accepted material, such as creosote. While recognizing fully the effectiveness of zinc chloride for commercial use, if applied by proper pressure process, the fact remains that for the small consumer, using the open-tank or brush treatment, or for the man who buys the preservative by the barrel for home use, the safest and most reasonable course is to buy the best creosote obtainable. This may mean buying it as creosote or under some trade name, but the result is the same, provided the oil is derived wholly from coal tar.

THE many kinds and forms of timber which it is desirable or economical to give a preservative treatment is a large subject itself. While it has been mainly the large consumers, such as railroads, which have recognized and adopted wood preserving methods, on the farm or around the average home, the advantages are equally apparent. The economy, permanence and attractiveness of many structures would be very greatly increased at a distinct saving as a result of proper treatment. Among the many classes of timber which can be advantageously treated may be mentioned fence posts, sills and foundation timbers, board-walks, wooden gates, pickets, wind mill frames, silo staves, shingles, floors of stalls, sill joists and framing under floors and timber in contact with foundation or with the ground.

A NEW idea is to paint farm buildings and similar structures with creosote. It can be easily applied, is absorbed by the wood and becomes permanent and serves both as a paint and a preservative. The same idea may be applied to garages and similar small structures around city and suburban homes.

Editorial

CANADIAN FOREST PROTECTION

PROTESTS from many different sources, following the frightful forest fires which destroyed hundreds of lives and millions in property, have been pouring in on the Minister of Lands, Forests and Mines of Ontario, Canada, about the present system of fire-protection of the forests. Boards of Trade of many cities and towns in the Province, deeply stirred by the fire losses, have sent recommendations urging a complete reorganization of the protection system. The most important recommendation is that a system of permits be arranged like those in vogue in British Columbia and Quebec. These require that before a settler can burn his "slash," *i. e.*, the trees and brush which he has cut down in order to clear his land, he must obtain a written permit from the fire-ranger in his district, so that the fire-ranger may be there to see that the brush is properly piled, that it is not too near the forest or houses and that the weather conditions are favorable. It works no hardship on the settler, in fact it is of material assistance to him, because the ranger is an expert, and will help him to burn his slash in the easiest way and to put out the fire if, by any accident, it assumes dangerous proportions.

The Ontario Government has nothing against the system itself, but fears that it will antagonize the settlers and thus lose votes. Experience has proved that this is not the case, as, wherever the system has been inaugurated, the settlers would not go back to the old way where any careless man could endanger the lives and property of all his neighbors. It is certainly to be hoped that the Minister will show a progressive spirit and that he will realize that the good of the Province and the protection of its lives and property are far more important matters than any political considerations.

In this connection it is necessary to protest against the haphazard placing of settlers on any and every kind of land, regardless of whether it is fit for cultivation or not. In the "clay belt" of Ontario, while the soil is admittedly agricultural, it is so difficult to bring under cultivation that the ordinary method of selling lands to settlers, just wherever they choose to locate, is a bad one. Settlers have been allowed to take up lands in a very scattered fashion, so that there are now large numbers of isolated farms. This makes it difficult and expensive for the government to open up roads and makes it practically certain, as was shown by the recent terrible forest fires, that, in case of a general conflagration, the settler will likely lose his life and certainly all his property. The proper and common-sense way would be to open up a certain section, build proper roads, lay out lots with some reference to the topography of the country, set aside forest reserves, which would serve to supply building timber, fencing and fire-wood, and compel the settlement of the whole area so prepared before allowing any settlement elsewhere.

In Quebec there is, in spite of the excellent system and the fire-protection associations, still much work to be done. In the districts outside of those patrolled by the coöperative associations there have been some very serious fires, particularly near Escalana on the National Transcontinental Railroad, where a fire sixty miles long was burning recently and, had it not been stopped providentially by rain, would have made it very difficult for the Saint Maurice Forest Protective Association to have prevented its entering their territory. The same was true of a large fire in the neighborhood of Saint Felicien on Lake Saint John, where the Association was compelled to maintain a large force of men to prevent the fire entering its property. The whole valley of the Saguenay River, famed for its scenic beauties, was burnt, and the smoke was so thick that navigation was impossible for several days. The Minister of Lands and Forests of Quebec, the Honorable Jules Allard, realizing these grave dangers, is at present engaged in an effort to correct them. His untiring efforts to get a better system of fire prevention and his marked success are in eloquent contrast with the actions of the Ontario officials.

THE WHITE PINE BLISTER RUST

THE blister rust, which is capable of rendering the growing of white pine throughout this country commercially impractical, did not come to our shores unheralded. As early as 1908 Dr. C. Alvin Schenck, forester for the Biltmore estate, warned certain foresters against importing white pine nursery stock from Germany, protesting that this disease would surely be introduced and would ravage the native forests. At that time there was no federal law or board controlling the importation of nursery stock, and the introduction of the chestnut bark disease from China went undiscovered until the chestnut trees began to die near the source of infection, New York City, with results known to all. This species is doomed, for there is no method of combating the disease.

Importations of white pine continued, in spite of this warning, which was not generally understood, until the Superintendent of Forests of New York, C. R. Pettis, dis-

covered the disease in the State plantations and in stock imported from the Heins and Sons nurseries, Germany. A conference of state foresters was called at once. Plantations were inspected, diseased trees eradicated and it was hoped that the danger had been averted. Further importations of pine were prohibited and control established by federal authority over the bringing in of all kinds of foreign nursery stock.

But the planting of imported pines purchased and distributed by commercial nurseries dealing in ornamental stock, for small forest and other plantations, had been quite extensive, and the efforts made by these state foresters failed to detect all the infected trees, largely for lack of specific funds with which to carry out the work with complete thoroughness. Appropriations depend on public interest, and the public were asleep and could not be aroused.

Suddenly, this season, alarming discoveries were made, in several localities, of diseased pines. Under the leadership of H. A. Reynolds, Secretary of the Massachusetts Forestry Association, a congressional appropriation was secured to scout for the detection of the disease in pines and on currants and gooseberries. The results to date reveal a wide-spread infection of the latter, covering large areas and every New England State, and even in Minnesota and Wisconsin, where it has been imported from sales through commercial nurseries.

Unlike the chestnut bark disease, the blister rust cannot spread from pine to pine, but finds a secondary host in the currant and gooseberry. By eliminating these species in the neighborhood of infected pines, as well as by completely eradicating the diseased trees themselves, there is still hope of saving the white pine.

But if the initial error of half-way measures is repeated, whatever effort is now put forth will be wasted. An interstate committee has been formed to take charge of the work, and after carefully canvassing the possibilities, has decided that the effort should be made. The work calls for state and national appropriations—for lack of which, at first, the disease escaped in the face of the inadequate efforts put forth to stop it. It calls for expert services, for the layman may not always recognize the trouble. It is a most potent example of the wisdom of intelligent technical control and direction of our state forestry departments,—for the state foresters have acted promptly and efficiently. There is still a tendency in certain quarters to discourage the efforts at eradication by either minimizing its importance, or, worse still, by throwing up the sponge and declaring that it is all over and nothing can be done to stop the scourge,—and this in the face of the fact that the disease is but fairly started. Such sentiments are distinctly inimical to the public welfare and deserve the most severe condemnation.

Let us unite in a determined effort to suppress the plague and save the white pine, noblest of all our forest monarchs.

THE FARM WOODLOT

IN a recent article, Mr. G. P. Wharton has shown that in the six New England States thirty per cent of the entire region is embraced in woodlots owned by farmers, a total of 11,500,000 acres, fully one-third of which is covered with worthless scrub, while of the remainder hardly 2 per cent is intelligently managed to produce trees. Yet this area is practically all absolute forest soil by reason of its steepness and rocky character. Much of it was once cleared for pasture, and is now reverting to forest.

The total per cent of land devoted to woodlots in other states varies, being lowest in fertile plains, or in regions not adapted to trees, and highest, as distinguished from large forest areas, in unsettled regions with much poor soil and rough topography, but will always total a very substantial percentage of the forest area, and amounts to about 7 per cent of the wooded area of the entire country.

A thrifty woodlot producing its maximum growth of timber adds enormously to the value of the farm, by supplying fuel and other material, by giving employment to labor and teams in winter, by protecting the home and crops from wind, and by increasing the desirability and marketability of the property. Farmers can afford to hold woodlot property permanently, carrying it as part of the farm unit and growing timber crops in spite of taxes and times when, under similar conditions, owners of forest lands not attached to farms find it unprofitable to do so, and sell or abandon the land after denuding it.

But the widespread neglect and abuse of woodlot property bids fair to put an end to the woodlot as an economic factor in farm management. Unless farmers are educated to the real value and possibilities of their woodland, this vast area will continue to retrograde as in the past.

Much can be accomplished by states through the establishment of demonstration areas. But to reach the individual, we must have men educated to the problem. *Courses in farm forestry should be made a compulsory part of the curriculum of every state agricultural college receiving government aid.* Men with at least this much education in forestry should be chosen as county agents under the Smith-Lever Law. Special state agents, experts in woodlot forestry, should be appointed under this same law in every important woodlot state.

In spite of all past efforts, the amount of absolute ignorance and indifference among woodlot owners as to the proper care of their property is nothing short of appalling, and the sooner this problem receives the recognition which it deserves, the better it will be for the great body of farmers on whose shoulders the responsibility rests for ownership and management of a very substantial portion of our future timber supply.

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AP-10-16

Abitibbi Paper Mills Not Burned

Newspaper reports of the great forest fires in Ontario, Canada, some of which were quoted in the August issue of AMERICAN FORESTRY, declared that at Iroquois Falls the great paper mills of the Abitibbi Power and Paper Company were destroyed. It is gratifying to announce upon information from the officers of the Company that the mills were not destroyed nor injured in the least, that only a few buildings were burned, and that there was no loss of life at Iroquois Falls. The statement is also made that the mills are not owned, as the newspapers said, by *Chicago Tribune* capital.

Book Reviews

Farm Forestry by John Arden Ferguson, A.M., M.F., Professor of Forestry, at the Pennsylvania State College. 249 pages. Price, $1.25. John Wiley & Sons, Inc., New York.

This book covers the subject of forestry as applied to the farm woodlot, and is especially intended for text-book use in agricultural colleges and high schools. It is the outgrowth of lectures delivered to agricultural students throughout several years. The author's aim has been to treat the subject from the broad standpoint of the woodlots in the great plains and prairie regions as well as in more eastern regions. With a teaching experience both in the central west (he was formerly Professor of Forestry at the University of Missouri), and in the east, he is in a position to appreciate the varying requirements in the different sections of the country. The subjects included are those of essential interest to the agriculturalist. The establishment of the woodlot, both by seeding or planting and by natural methods, is discussed with hints as to the best trees to plant in different sections. The care and protection of the woodlot is treated and also the very important subject of woodlot management. A conception of the woodlot as forest capital is given with suggestions as to the amount of wood to remove annually and the methods of securing a sustained annual yield. Chapters are also devoted to the harvesting and marketing of woodlot products and to wood preservation. In the appendix, there is included a suggested list of practical exercises for a course in farm forestry.

The Woodcraft Girls at Camp. By Lillian Elizabeth Roy. Price $1.25, George H. Doran Company, New York.

This is the story of the frolics and tribulations of an actual outdoor camp of Woodcraft Girls, the formation of the band, their ceremonies, life and sport on a woodland farm in Jersey. Full description of equipment used, woodcraft rites, membership, etc. (accurate in every detail); written by a member of the Woodcraft League founded by Earnest Thompson-Seton.

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Canadian Department

BY ELLWOOD WILSON

Secretary, Canadian Society of Forest Engineers

During the forest fire at Abitibbi, we are informed that the wood piled up for winter use by the Abitibbi Pulp and Paper Company was burnt and that they will have to at once commence to cut a fresh supply. During the fire all the people in the neighborhood were compelled to take shelter in the mill, a large, concrete-steel building, which fortunately lay in a little depression of the ground and gave protection from the fire and smoke.

Dean Adams, of the Faculty of Applied Science of McGill University, Montreal, has been visiting Grand'mère, to look over the plantations, nurseries and experimental forestry work of the Laurentide Company, Limited. Mr. Adams is a member of the Dominion Conservation Commission and has written a good deal on conservation in general.

Price Bros. & Company, Ltd., have secured funds for additions to their mills. The new newsprint mill will be ready in February of next year with a capacity of 62,000 tons per annum and the pulp production will be increased to 55,000 tons per annum.

The St. Maurice Lumber Company, of Three Rivers, P. Q., have just finished constructing fifteen miles of telephone line connecting up their headquarters camp with their river driving depots.

Nine fires, which either partially or wholly destroyed woodworking plants, were reported during the past month.

Sealed tenders were asked for by the Minister of Lands for British Columbia during July for the purchase of License No. 90, to cut 7,130,000 feet of Douglas fir, hemlock, cedar, white pine and balsam and 535 cords of shingle bolts. Three years will be allowed for the removal of the timber.

Messrs. D. A. Macdonald and G. R. Melrose have been elected associate members of

the Canadian Society of Forest Engineers. Both these gentlemen are members of the Dominion Forest Service, stationed at Calgary, Alta.

Ellwood Wilson, Jr., who studied forestry and engineering at Cornell and McGill Universities, has enlisted with the 242nd Forestry Battalion, C. E. F., and has been given a commission as lieutenant. From the Laurentide Company, Limited, Sergeant Lendrum and Corporal Roberts have also joined this battalion. Under Colonel J. B. White, this battalion is rapidly getting up to strength and is getting some splendid recruits, many of them coming all the way from British Columbia. They are quartered in the Guy Street barracks in Montreal and daily drills are whipping the men into shape. This is an excellent opportunity for foresty students who want a year or two of practical experience, as this battalion is recruited to do forestry and lumbering work, under military discipline and direction, in both England and France. Letters received from men who went over with the first Forestry Battalion are most enthusiastic.

Doctor Fernow, Mr. Clyde Leavitt, and Mr. S. L. de Carteret have been at the meeting of the Eastern Foresters' Society and the Society for the Protection of the New Hampshire Forests at Crawford Notch, New Hampshire.

H. R. MacMillan, Chief Forester of British Columbia, has recently returned from his trip to England, South and East Africa, India, Australia and New Zealand, and expects to leave shortly for China and Japan. He was sent out by his Government to investigate trade openings in connection with the lumber industry and his advance report is said to be most favorable and it is hoped that a big export business will be built up as a result of his trip. His conclusions are that there is a splendid opportunity for lumber, pulp and paper business in the countries visited.

All the paper mills in Canada are either enlarging their plants or planning to do so and it is pretty certain that, *if* the forests are properly protected, so as to give a permanent supply of raw material, that Canada will take the place of Scandinavia in supplying the world with pulp and paper.

It is reported that Buffalo interests will build a pulp mill "somewhere in Labrador." This looks like a foolhardy proposition, as it is difficult enough to erect and supply with raw material and labor a pulp mill in ordinary locations, but especially so to build it almost within the Arctic Circle, where access could be had for only a few months in the year and where the small and scanty spruce would have to be used.

Peeled pulp wood at Jacksonboro, on the Transcontinental in Ontario is selling, two feet long, for ten dollars a cord, f. o. b. cars, and is being shipped to Wisconsin, where it will cost delivered $17 to $18 per cord, as against $12 to $14. If the price continues to rise there will be big money in planting spruce on poor lands near railroad lines.

Mr. E. H. Finlayson, District Inspector for Alberta, reports a very busy summer.

Mr. G. C. Pichè, Chief Forester of Quebec, has decided to postpone the opening of the Government Nursery and Forest Experiment Station until next spring. Six good students will enter the Quebec Forestry School as freshmen this fall.

The experience of the present season has proved conclusively that with very few exceptions, the Dominion charted railways of Canada have faithfully observed the requirements relative to forest fire protection imposed upon them by the Board of Railway Commissioners. The proof of this lies in the fact that, notwithstanding the exceptionally dry season, practically no forest fires of any serious consequence have occurred which could be attributed to railway agencies. It is true that a good many fires have started, many of them resulting unavoidably from the operation of trains, but the records show that, in general, the railway employes have been prompt in discovering, reporting and extinguishing these fires before they had time to cause serious damage.

Especial care has been taken by the companies in keeping the fire-protective appliances of engines in good order, and a large amount of work has been done in disposing of inflammable dèbris on rights of way. Special patrols have been maintained in forest sections, supplemented on all lines by the observance of special instructions to all regular employes relative to the reporting and extinguishing of fires in the vicinity of the track.

Not only have the railways been remarkably efficient in handling their own fires, but they have extinguished or aided in extinguishing many fires that originated at a distance from the track, due to all sorts of outside agencies. They have coöperated, wherever possible, with governmental or private fire-protective agencies, with beneficial results which, a few years ago, might have been thought impossible.

Reports indicate that, in many sections, settlers' clearing fires are the most serious source of fire danger. The experience of this year indicates the extreme importance of controlling this hazard, through the strict enforcement of existing legislation in Quebec, New Brunswick, Nova Scotia and British Columbia and the enactment and enforcement of similar legislation in Ontario.

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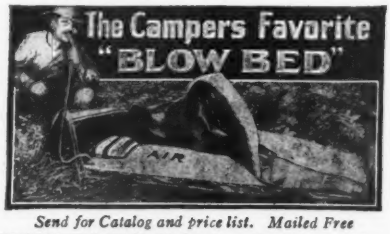

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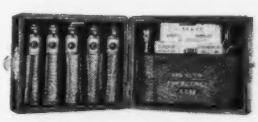

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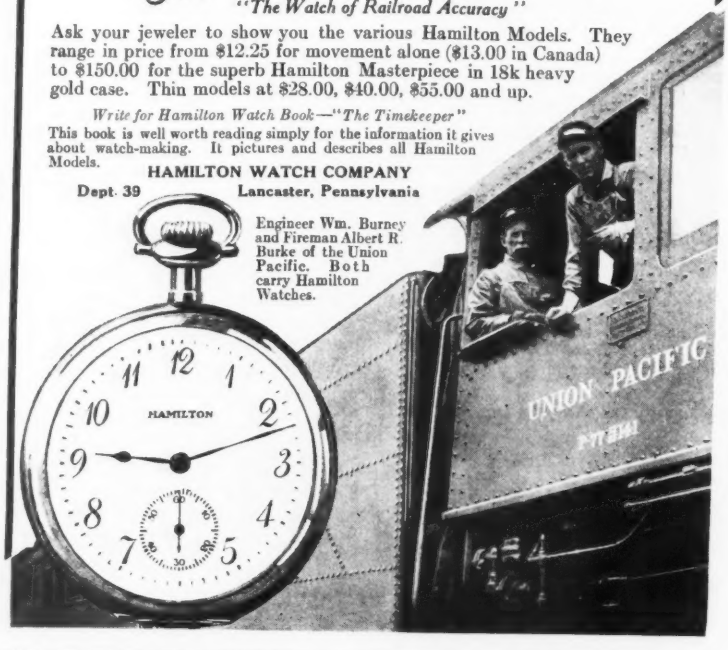

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POSITION—Young man (33), single, seven and a-half years' technical training. Will consider position as City Forester, Park Superintendent, Superintendent of Private Estate or Consulting Landscape Architect for railroad. Education consists of post-graduate work in prominent middle-western school of forestry, supplemented by several years post-graduate work in recognized school of landscape design in the East. Experienced in public and private forestry, including work in the Forest Service, the various phases of municipal forestry such as extension work, and tree surgery; and also the designing of parks, playgrounds, and private estates. References given and required. Address XYZ, care of AMERICAN FORESTRY.

COMPETENT ENGLISH FORESTER and landscape gardener desires position as park superintendent, city forester or superintendent of private estate. Thoroughly experienced in the various branches of tree surgery, including pruning, spraying and planting of trees and shrubs. Can handle men and get results. Forty-five years old and married. Will consider position with contractors in allied lines of work. At present employed. Address A. E. W. care of AMERICAN FORESTRY. (9-11)

PRACTICAL WOODSMAN AND FOREST ENGINEER with thorough experience this country and Europe will take charge of forested estate or game preserve. An expert in managing and improving woodlands, and can show results. Highest references as to character, training, and ability. Address Woods Superintendent, Care AMERICAN FORESTRY MAGAZINE, Washington, D. C.

YOUNG man (28), single, technical education, five years' general engineering experience, as instrument man and computer, on surveys, and as inspector and superintendent on construction. Also field and office experience with U. S. Forest Service. Capable of taking charge of party; desires position with forester or lumber firm. Address Box 32, care of AMERICAN FORESTRY, Washington, D. C.

FORESTER with three years' practical training and ten years' experience (willing to work with his hands as well as with his brain) desires position as forester on private estate. Thoroughly acquainted by practical experience with the planting and care of trees, wild flowers, and shrubs. References furnished on request. Address Box 35, care of AMERICAN FORESTRY. 8-11

WANTED—Secretary. Capable and experienced stenographer (married), possessing agricultural college education to act as secretary to executive of large horticultural enterprise. Only those possessing these qualifications need apply. State full particulars and salary desired in first letter. Address Box 20, care of AMERICAN FORESTRY, Washington, D. C.

CARETAKERS, FIREWATCH AND GENERAL Help to Forester or Owner. Man and son (adult). Reliable Americans, strict to duty. A-1 references. Good home rather than high pay wanted. New York or East. Address L. H. Robertson, 323 Sussex Avenue, Newark, N. J. 8-10

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BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.* :: :: :: ::

AMERICAN BOYS' BOOK OF BUGS, BUTTERFLIES AND BEETLES	$2.00
FOREST VALUATION—Filibert Roth	1.50
FOREST REGULATION—Filibert Roth	2.00
PRACTICAL TREE REPAIR—By Elbert Peets	2.00
THE LUMBER INDUSTRY—By R. S. Kellogg	1.10
LUMBER MANUFACTURING ACCOUNTS—By Arthur F. Jones	2.10
FOREST VALUATION—By H. H. Chapman	2.00
CHINESE FOREST TREES AND TIMBER SUPPLY—By Norman Shaw	2.50
TREES, SHRUBS, VINES AND HERBACEOUS PERENNIALS—By John Kirkegaard	1.50
TREES AND SHRUBS—By Charles Sprague Sargent—Vols. I and II, 4 Parts to a Volume—per Part	5.00
THE TRAINING OF A FORESTER—Gifford Pinchot	1.12
LUMBER AND ITS USES—R. S. Kellogg	1.15
THE CARE OF TREES IN LAWN, STREET AND PARK—B. E. Fernow	2.17
NORTH AMERICAN TREES—N. L. Britton	7.30
KEY TO THE TREES—Collins and Preston	1.50
THE FARM WOODLOT—E. G. Cheyney and J. P. Wentling	1.70
AMERICAN FOREST TREES—Henry H. Gibson	6.00
IDENTIFICATION OF THE ECONOMIC WOODS OF THE UNITED STATES—Samuel J. Record	1.25
PLANE SURVEYING—John C. Tracy	3.00
FOREST MENSURATION—Henry Solon Graves	4.00
THE ECONOMICS OF FORESTRY—B. E. Fernow	1.61
FIRST BOOK OF FORESTRY—Filibert Roth	1.10
PRACTICAL FORESTRY—A. S. Fuller	1.50
PRINCIPLES OF AMERICAN FORESTRY—Samuel B. Green	1.50
SEASIDE PLANTING OF TREES AND SHRUBS—Alfred Gaut	1.75
FAMILIAR TREES—G. S. Boulger	1.50
MANUAL OF THE TREES OF NORTH AMERICA (exclusive of Mexico)—Charles Sprague Sargent	6.00
AMERICAN WOODS—Romeyn B. Hough, 13 Volumes, per Volume	5.00
HANDBOOK OF THE TREES OF THE NORTHERN U. S. AND CANADA, EAST OF THE ROCKY MOUNTAINS—Romeyn B. Hough	6.00
GETTING ACQUAINTED WITH THE TREES—J. Horace McFarland	1.75
PRINCIPAL SPECIES OF WOOD: THEIR CHARACTERISTIC PROPERTIES—Charles Henry Snow	3.50
NORTH AMERICAN FORESTS AND FORESTRY—E. R. Bruncken	2.00
HANDBOOK OF TIMBER PRESERVATION—Samuel M. Rowe	4.00
TREES OF NEW ENGLAND—L. L. Dame and Henry Brooks	1.50
TREES, SHRUBS AND VINES OF THE NORTHEASTERN UNITED STATES—H. E. Parkhurst	1.50
TREES—H. Marshall Ward	1.50
OUR NATIONAL PARKS—John Muir	1.91
THE LONGLEAF PINE IN VIRGIN FOREST—G. Frederick Schwarz	.75
LOGGING—Ralph C. Bryant	3.50
THE IMPORTANT TIMBER TREES OF THE UNITED STATES—S. B. Elliott	2.50
FORESTRY IN NEW ENGLAND—Ralph C. Hawley and Austin F. Hawes	3.50
THE PRINCIPLES OF HANDLING WOODLANDS—Henry Solon Graves	1.50
SHADE TREES IN TOWNS AND CITIES—William Solotaroff	3.00
THE TREE GUIDE—By Julia Ellen Rogers	1.00
FOREST PHYSIOGRAPHY—By Isaiah Bowman	5.00
MANUAL FOR NORTHERN WOODSMEN—Austin Cary	2.12
FARM FORESTRY—Alfred Akerman	.57
THE THEORY AND PRACTICE OF WORKING PLANS (in forest organization)—A. B. Recknagel	2.10
ELEMENTS OF FORESTRY—F. F. Moon and N. C. Brown	2.20
MECHANICAL PROPERTIES OF WOOD—Samuel J. Record	1.75
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* This, of course, is not a complete list, but we shall be glad to add to it any books on forestry or related subjects upon request.—EDITOR.

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Declaration of Principles and Policy of The American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay $367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies

National and State Forests under Federal and State Ownership, administration and management respectively; adequate appropriations for their care and management; Federal coöperation with the States, especially in forest fire protection.

State Activity by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners, nonpolitical departmentally independent forest organization, with liberal appropriations for these purposes.

Forest Fire Protection by Federal, State and fire protective agencies, and its encouragement and extension, individually and by coöperation; without adequate fire protection all other measures for forest crop production will fail.

Forest Planting by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

Forest Taxation Reforms removing unjust burdens from owners of growing timber.

Closer Utilization in logging and manufacturing without loss to owners; aid the lumbermen in achieving this.

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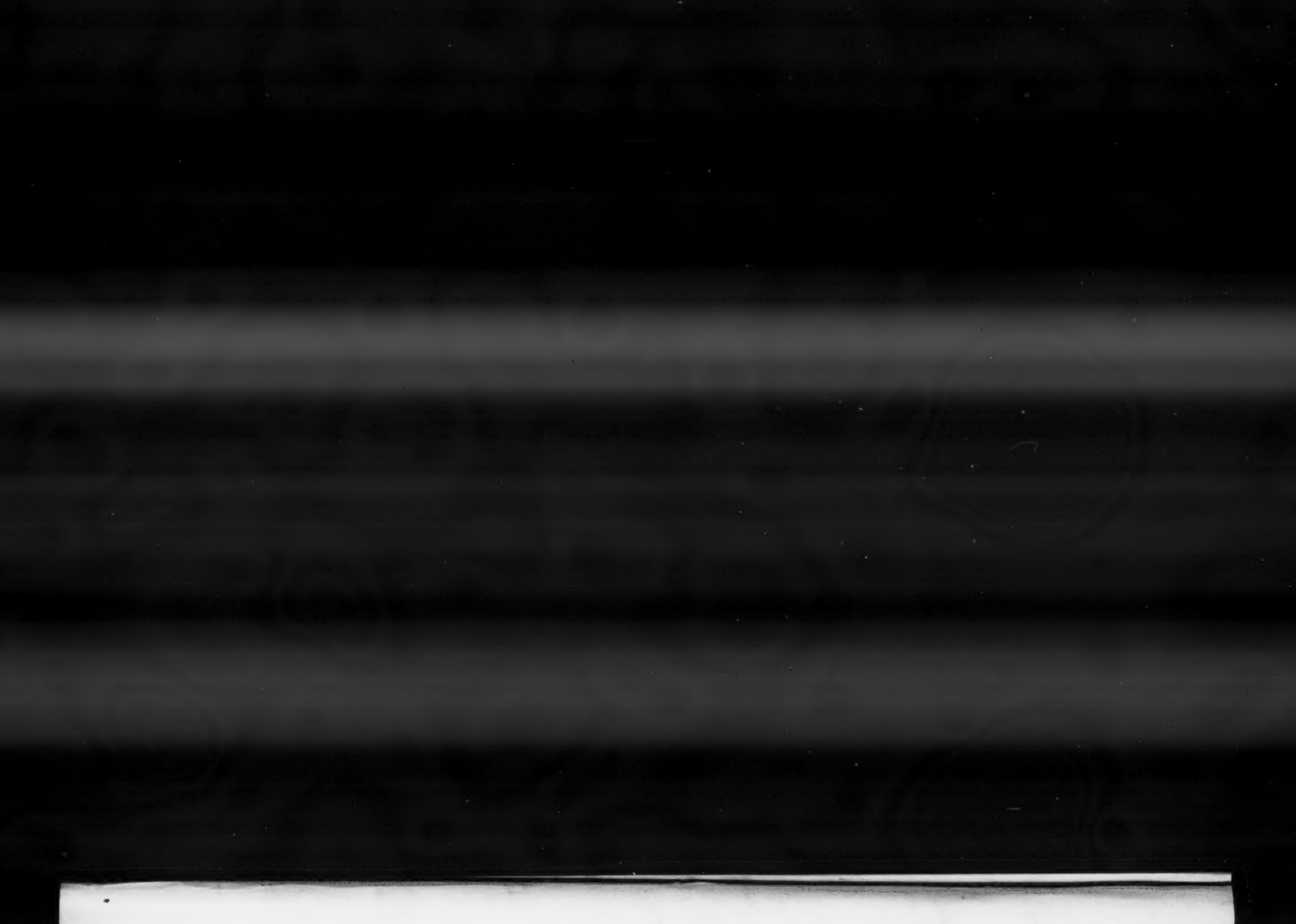
Classification by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.